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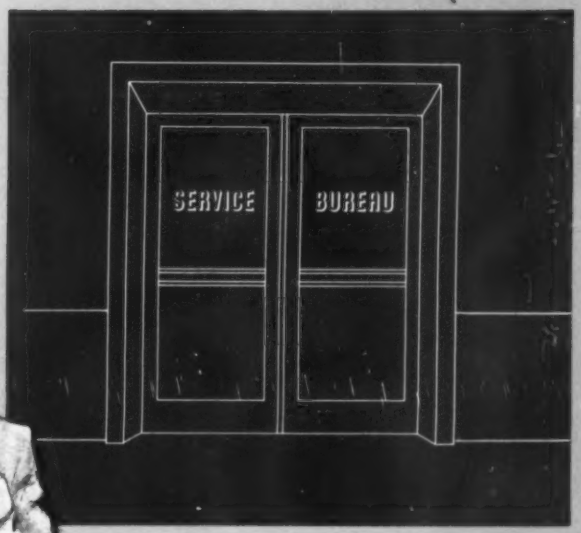

The Place of Service Organizations

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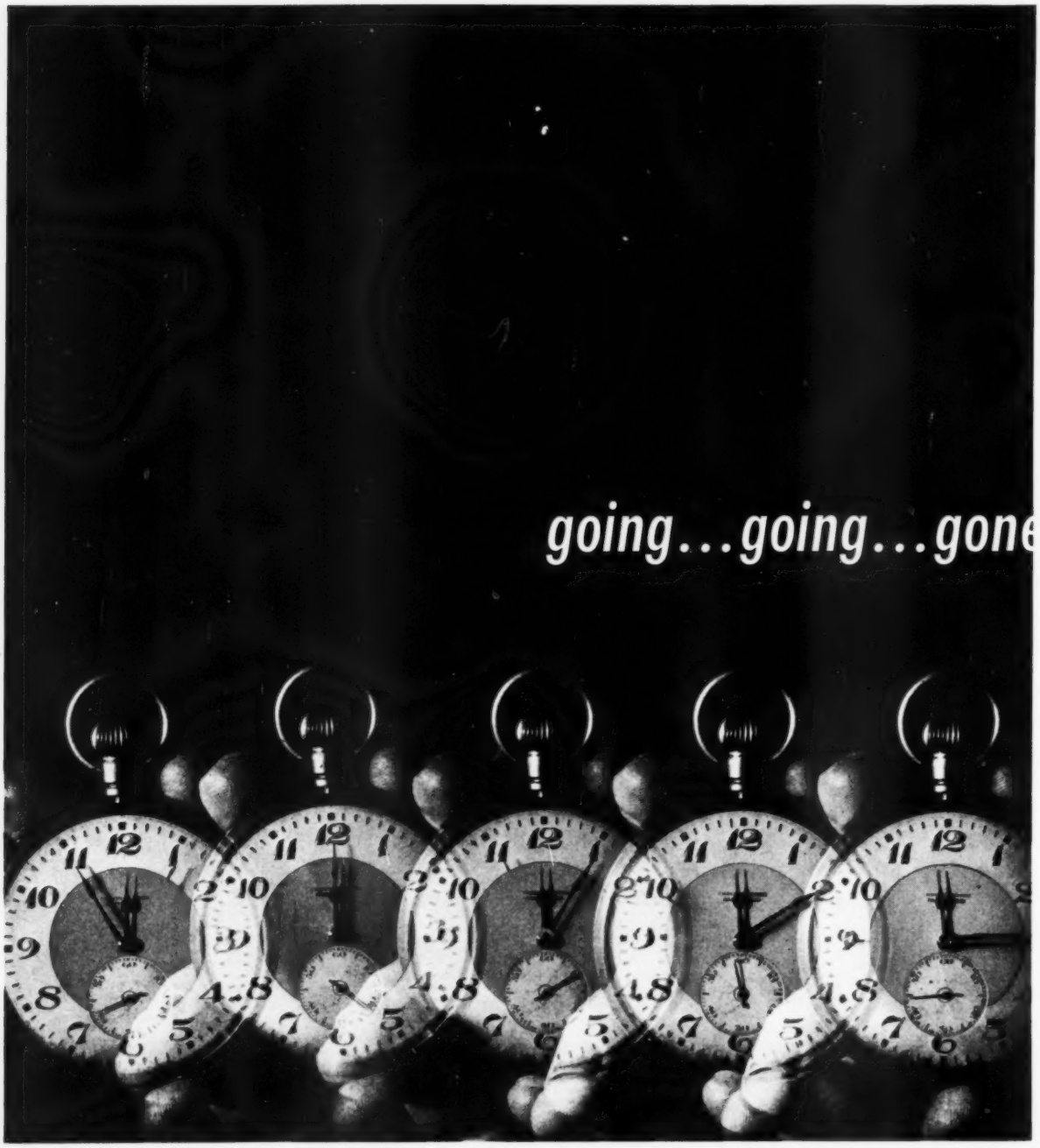
The Magazine of Automatic Office Methods and Management



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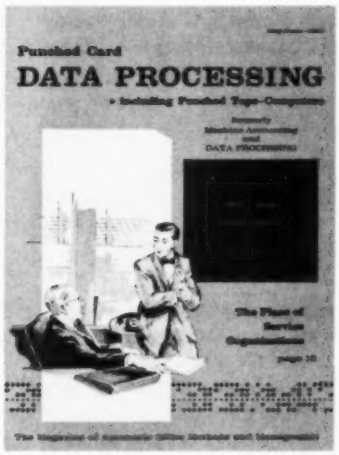

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OBSERVATIONS . . .

from the publisher . . .

What is the obligation and responsibility of a periodical to its readers?

As an instrument of information, it must do an honest reporting job. As an educational medium it must do its best to give readers methods of improving their performance.

It can further serve as a *"sounding board" of opinions* on subjects of current interest.

It is in this latter context that we present in this issue the results of a survey just concluded (March and April 1959) which included the somewhat controversial question of the most appropriate name for the department responsible for the "methods and machine functions" in this field. (see page 9)

We submit the results of this survey for your review. It is clear that there is need for concerted action in effecting a standardization of *job titles* before the situation becomes more confused. This is necessary if there is to be greater understanding of the role this field plays in serving management and the public.

The proper place to start is with *job titles.* If department managers can agree on an acceptable *job title,* manufacturers, associations, publications and all others concerned with the "data processing" function will not hesitate to follow suit.

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THE AUTHORS

CLIFFORD S. WILLIS *("Automation: Challenge — Not Threat — to Office Workers")* is a sales promotion and public relations consultant. Starting 27 years ago as a newspaperman, he held editorial and advertising executive posts in this field. Later he entered corporation work and was engaged as sales promotion manager of firms including Pepsi-Cola Company, Durkee Famous Foods, United States Rubber Company *(General Products Division)*, and Philco Corporation *(New York Distributing Branch)*. A Columbia University graduate, he holds an A.B. degree from Columbia College and a B. Lit. degree in Journalism from the Columbia School of Journalism.

RUDOLPH C. MENDELSSOHN *("Experiences in Data Processing")* has been with the U. S. Department of Labor Statistics since 1940. He is a graduate of the University of Chicago. Currently, as a statistician and Chief of the Branch of Employment Statistics Operations, he is responsible for statistical operations leading to monthly production of the nation's figures on employment, hours and earnings by industry from the Government's largest monthly establishment reporting samples. Recently, he was given the Labor Department's Meritorious Service Award by Secretary Mitchell for his work in directing the development of efficient data processing methods for the BLS employment statistics program.

ABE ROTHMAN *("Experiences in Data Processing")* has 25 years experience in planning, developing, conducting, reviewing and evaluating a variety of large scale statistical surveys for the U. S. Bureau of Labor Statistics. In his capacity as Chief of the Office of Statistical Standards, he has been instrumental in developing, for use in statistical surveys, special techniques and procedures which would yield better controlled operations, more accurate results in shorter time periods and more efficient use of personnel and equipment. This has been accomplished by translation of many clerical-statistical functions from hand operations to data handling equipment.

ORLAND M. SCOTT *("A Look at Service Bureaus")* began his career with IBM in 1938 and after a tour of duty as an officer in the U. S. Navy he returned to IBM in 1946.

He was promoted to Branch Manager in 1949 and subsequently to District Manager. In 1953 he was promoted to Sales Manager of the Data Processing Division and then to General Sales Manager of this division. When The Service Bureau Corporation officially became a wholly-owned IBM subsidiary on January 1, 1957, Mr. Scott was elected President of the company. On May 25 of this year he was named General Manager of the IBM General Products Division which will develop and manufacture intermediate and small computing systems and punched card accounting machines.

G. S. MURPHY *("The Case for Management Consultants")* is a New Yorker, graduate of Manhattan College and the New York University Graduate School of Business. He has been associated with Fairbanks Associates, Inc. since its founding in 1952 and was recently elected Vice President of that firm.

J. F. FISHER *("The Management Consultant Looks at Data Processing")* is a partner in the Management Engineering firm of Benjamin Borchardt and Associates with whom he has been associated since 1943. He is responsible for all of his firm's assignments in the data processing field.

A registered professional engineer in California, he has served as president and director of the Los Angeles Chapter of the Society for Advancement of Management. He is a graduate of Whitman College in mathematics and, prior to his consulting career, served as Assistant to the President, Seattle Gas Company, and as Chief Industrial Engineer for a pulp and paper manufacturer and converter.

D. L. COATES *("Automated Production Control")* was graduated from Columbia University in 1954 with a degree in economics. He was instrumental in affecting the transfer of many production control functions from manual to a punched card basis. He has addressed American Management Association meetings on the subject of automated production control at Lake Saranac and New York City. Nineteen years with Pitney-Bowes, Inc., he has successively held positions of Quality Control Clerk, Expeditor, Subcontracting Supervisor, General Scheduling Supervisor, Production Tabulating Manager and presently holds the position of Assistant to the Treasurer—Tabulating.

FREDERICK J. REX, Jr. *("A Computer Primer")* is an engineer who has spent his entire post graduate career in the accounting and data processing fields. He received his BSME from Tufts University in 1950. From 1950 to 1957 he was with IBM. From 1957 to the present he has been with United Shoe Machinery Corporation, where he is a Project Engineer designing equipment and systems using Kimball punched tags. He is a member of the Institute of Radio Engineers and also The Professional Group on Electronic Computers within that organization.

LOIS HIRST *("Increasing the Utilization and Scheduling of Key Punch Sections")*, a graduate of Michigan State College, is the Manager of Data Processing Development at Peters, Griffin, Woodward, Inc. Her concern is the development of integrated data processing equipment and methods for the field of radio and television station representation, a newcomer to automation.

She was formerly a methods technician with Remington Rand and as such was responsible for the installation of many systems including a great variety of applications. During this time, she also instructed customer personnel from many job levels on programming and operating all types of equipment.

Comments from Readers

Are Punched Cards Obsolete?

San Diego, Calif.

I just received your first copy of "Machine Accounting and DATA PROCESSING."

I noticed the first article on Punched Cards. I am chairman of the March 17 program of the National Machine Accountants Association on the topic, "Are Punched Cards Obsolete?" Since you are a new magazine, I was wondering if you would allow me to duplicate and pass out to our 125 members a copy of your article? . . .

I am also writing a book on Office Automation to be published this fall and would like to include some or all of the articles on punched cards in it. Could I have this permission too? *(Permission granted.*—Ed.)

E. Dana Gibson, Professor
Office Management
San Diego State College

Scheduling

Los Angeles, Calif.

In your Charter Issue of "Machine Accounting and DATA PROCESSING" magazine I read what I thought to be an excellent article entitled, "Scheduling in the Data Processing Department," by Mr. Jack Perlstein of the Schering Corporation.

Since reading the article, I have considered setting up similar boards in the Data Processing Division here at Golden State Mutual Life. *(Mr. Durousseau also requested detailed information which we were pleased to send.*—Ed.)

Antoine Durousseau
Manager
Data Processing Division

Readability

New York, N. Y.

I have just recently reviewed with interest your contribution to the field of Data Processing Literature. Let me congratulate you on the quality and readability of these early issues. Please keep it that way.

R. A. Thorpe
Systems Products Co-ordinator
Remington Rand Division
Sperry Rand Corporation

Editorials

Boston, Mass.

I'd like very much to take this opportunity to congratulate your very fine editor on his editorials.

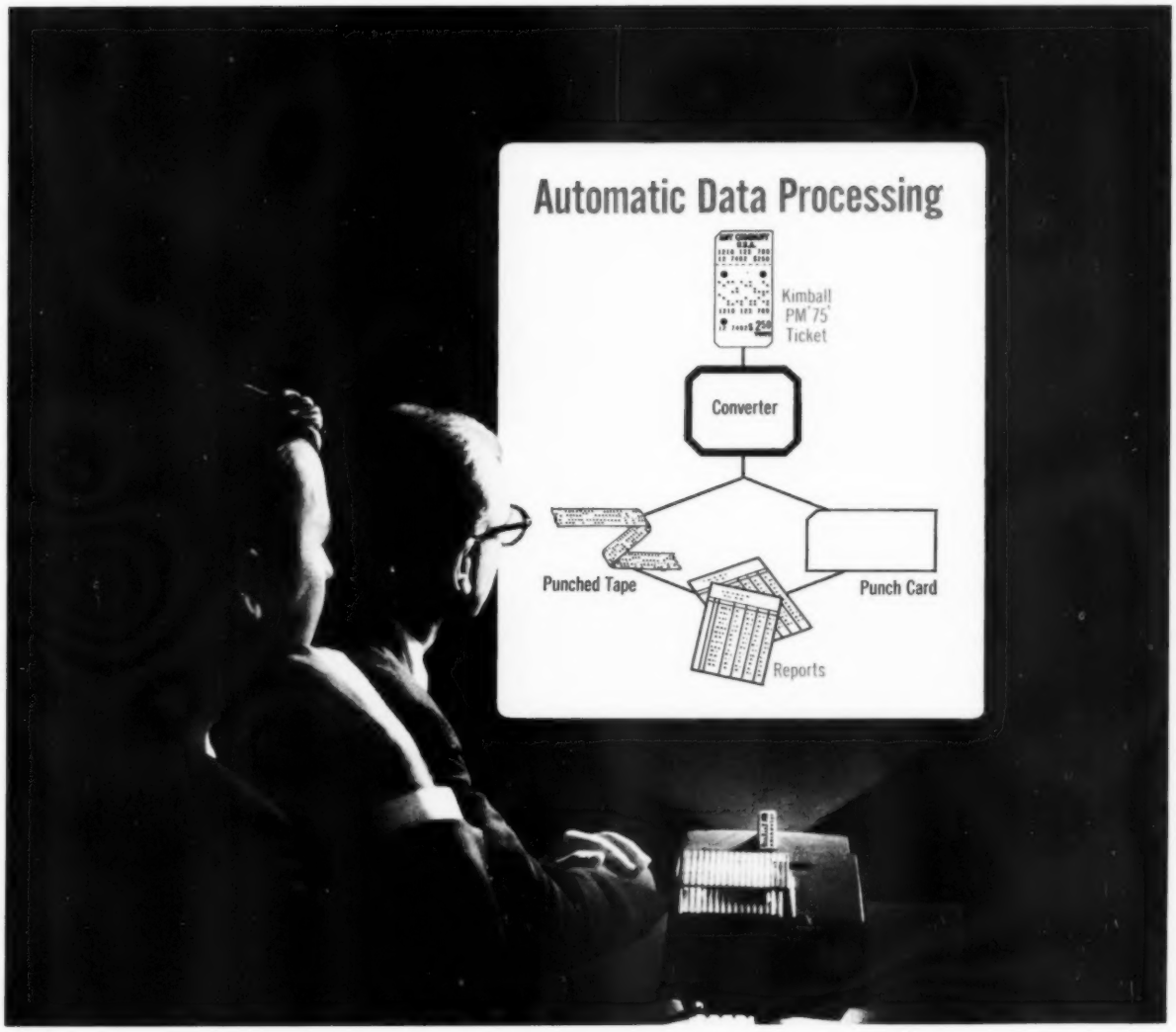
Mr. Murphy's writings reflect an uncanny insight into the personalities and practices of Data Processing personnel and those so-called "V-P's" who control Data Processing. His editorials *carry a message* and his message *gets through* to those readers who are *honest* with themselves.

After reading Mr. Murphy's Jan./Feb. editorial, I felt that I had been "bawled out," and my boss, his boss and many of our associates had also been "bawled out." We all had it coming and *I*, for one, appreciate it!

I have recently subscribed to your publications. Mr. Murphy's editorials alone are well worth the subscription price to me.

A Proper(?) Bostonian

■ ■ ■



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AUTOMATION: Challenge–Not Threat –to Office Workers

Prepare Now For A Better Future

THROUGHOUT THE BUSINESS WORLD today, automation is fast becoming an integral part of commercial housekeeping. It is taking the drudgery out of the interminable clerical processes of record-keeping, computations, and similar chores. Jobs that formerly took weeks to perform now may be accomplished in days, or even hours, and by fewer workers, more efficiently and at less expense.

The robots, represented by data processing equipment, are revolutionizing office life. But while they present a challenge with a capital "C" to office workers, they do not necessarily constitute a threat to their security nor to their future.

On the contrary, automation presents office workers with their greatest opportunity for career advancement, providing they *"get into orbit"* with automation now!

The progressive employee, who is truly interested in his own career *(and in his company's future)*, should make it his business to analyze the systems and procedures employed in connection with his operations. It is important that he become acquainted with the various types of automation that might be employed.

Instead of fretting about the time when his firm will install data processing equipment, he should immediately take steps to acquaint himself in advance with:

(a) *Systems as presently constituted;*
(b) *Systems contemplated.*

Information Available

It is usually possible to get necessary information from representatives of data processing equipment suppliers as they call at the office to study present procedures now being followed by office personnel.

Besides, most manufacturers of automatic equipment maintain schools offering free instruction in the use of their machines. Office workers should apply, through their supervisors, for admission to classes conducted by these manufacturers.

Better yet, for those office workers who have the will, means, and drive to really get into orbit with automation, enrollment in courses on data processing and systems and procedures being offered by progressive universities and business schools throughout the country will yield bountiful dividends in better jobs, security, and greater earnings.

By Clifford S. Willis

Lack of Comprehension

The average office worker seems to shy away from automation. He apparently is disinclined to give it much serious thought. Very likely he fails to comprehend what it means. After all, automation simply means the coordination and proper layout of work as presently done, and the elimination of the drudgery of repetitive clerical work.

Great opportunities are at hand for the alert office worker in the area of programming. No machine can plan its own work, nor execute it without direction. The human hand and mind must continue to do this. Office workers who are willing to prepare themselves for technological progress will profit by it.

Perhaps much of the anxiety that many office workers have in connection with automation lies in the common human fear of machinery — the reluctance to deal with something strange, new, or unknown. A little sound reflection will show the groundlessness of such fear.

For instance, there was a time when office workers feared the typewriter. Their fears were groundless. Instead of cutting down employment, it created more jobs.

Even today, the electric typewriter is not being accepted in some offices. Only a few weeks ago, one large concern, wishing to speed up production and make things easier for its personnel, had electric typewriters installed on a trial basis. Because its employees were afraid of the machines, unwilling to change-over to the new, the company decided to discard its conversion program.

The adding machine, forerunner of the automatic computer, had a rough time when first introduced to office workers years ago. Yet this familiar piece of equipment has not lessened the number of bookkeepers and accountants.

Dictating equipment was vigorously resisted by stenographers at first. They feared they would lose their speed, and consequently their jobs, if they had to use these machines. Experience has shown that dictating equipment has increased productivity all around, and has made more jobs with more pay!

While it is true that automation brings with it many changes in organization, it is fallacious to assume that it will, overnight, result in wholesale displacement of office workers. Intelligent foresight and long-range planning will, in most instances, condition personnel for the transition to automatic office procedures.

Individual Responsibility

However, it remains for the office worker himself to protect his future by scanning the new horizons of automation — by realizing it presents a challenge, not a threat.

This viewpoint is sustained, in effect, by Frank C. Woolard* in speaking on *"Machines in the Service of Man":*

"Automation," he said, *"is not a device with which to outlaw, displace or dispense with man. It is a means for increasing man's stature and extending his ability to produce in greater volume with less physical effort or mental strain."*

Education is, always has been, and always will be the key to man's progress. Office workers owe it to themselves, their employers and their families, to learn how to fit into the pattern of automation in their business organization.

One of the best ways of acquainting oneself with automation is to get the habit of reading the nontechnical literature issued by equipment manufacturers. This magazine, for instance, features in each issue a section entitled "Useful Literature" in which literature available without charge from the manufacturers of data processing equipment is briefly described.

"Programming — New Profession for You," by Remington-Rand is one outstanding example of the type of orientation literature that forward-looking office workers should read. It is written in nontechnical language, and outlines in readable fashion the function of the programmer in industry today, the exact type of work involved in all phases of programming, the training of a student programmer, qualifications necessary for the job and the future possibilities for newcomers in this field.

An entirely new technique in banking procedures has been brought into being by the selection of Magnetic Ink Character Recognition as the common language approach. Therefore, the ambitious office worker will find it worthwhile to investigate the use of magnetic as well as punched tape in its application to automated business procedures.

Orientation in the various applications of punched and magnetic tape systems can be acquired by study of the free literature which may be obtained by request at local offices of equipment manufacturers, including such firms as Teletypewriter Corp., International Business Machines Corp., Friden, Inc., Burroughs Corp., Royal McBee and Addressograph Corp.

As a lad, Abraham Lincoln said, *"I will study and get ready, maybe my chance will come."* He made ready for the challenge, and when it came, he met it.

The challenge of automation could well be the office worker's opportunity for a bigger and brighter future. Why not get ready to meet it? ■

*From *Automation-Friend or Foe?* by R. H. MacMillan.

SPECIAL REPORT

Readers Cast Their Vote for a Job Title

AS A PART OF A COMPREHENSIVE SURVEY we are currently conducting on many facets of this field, we asked our readers the following questions (among many others).

"Which of the following titles do you feel is most appropriate for the person in charge of the department which uses PUNCHED CARD *or* PUNCHED TAPE *equipment in preparing reports and accounting procedures?"*

Manager, data processing;

Manager, machine accounting;

Manager, tabulating;

Other.....

2291 readers responded to this question. Here is the result of their preference.

1103—Manager, Data Processing
782—Manager, Machine Accounting
281—Manager, Tabulating
125—Other

Some additional factors are significant. First of all is the question, "Who are the people who responded to this questionnaire?" Here is a breakdown of the titles they currently employ:

296—Manager, Data Processing
296—Manager, Machine Accounting
653—Manager, Tabulating or IBM Department
240—Systems Manager
101—Office Manager
183—Controller
105—President, Vice-President or Secretary-Treasurer
414—Other (decidedly different from above)

It can be seen that this is a reasonably good cross-section of all levels of personnel who are concerned with or affected by the activity in this field. These are the facts . . . the rest is largely comment.

One thought stands out above all others in analyzing the results of this survey. There is need for a concerted educational program at all levels if there is to be progress toward improved understanding in this field. Management, other departments and the public are already overwhelmed by the "mysteries surrounding punched cards, tape and so-called giant brains." But how can they understand us when we don't even understand ourselves? Manufacturers, associations, publishers, and educational institutions must agree on a term and unify their efforts to foster its acceptance.

The situation has been complicated by several factors. Although punched card activity has been widespread for several decades, it is only recently that management has become dramatically impressed with its full value and real possibilities. Punched paper tape equipment and electronic computers catapaulted the "tab department" into the attention of the front office. *"Integrated data processing"* and *"electronic data processing"* overnight became the panacea for all management ills. These are truly remarkable contributions to be sure. But what about *punched card data processing*? Is this not yet the primary contributor to the data processing function? Should it then be considered as something detached from the complete activity?

Another question asked in our questionnaire was: *"Should the addition of an electronic computer have any effect on this (job) title?" How?*

1773 respondents replied "No."

426 said "Yes."

Of those few who answered "yes" and where a write-in was given, that most commonly inserted was "manager, electronic data processing," plus other variations on the term "data processing". This, of course, clearly indicates that there is common association of electronic computers with the term "data processing."

While recognizing this as contributing to the problem it should not be difficult to overcome if it is attacked now. The best method of accomplishing this,

(continued on page 45)

See also "Observations" from the Publisher — on page 1.

Survey reports on other topics are currently being processed and will be included in early issues of this magazine and our companion publication, The PUNCHED CARD DATA PROCESSING Annual. These reports include punched card and computer application studies by various industries and company size, trends in equipment purchasing, and others.

EXPERIENCES in DATA PROCESSING

By Rudolph C. Mendelssohn and Abe Rothman

The Bureau of Labor Does Not Stand Still But Advances Step by Step

RUDOLPH C. MENDELSSOHN

ABE ROTHMAN

THE BUREAU OF LABOR STATISTICS recently acquired a medium-scale electronic computer — the IBM 650. This action is the most recent step in a steady postwar progression designed to keep data processing facilities equal to the growth of Bureau programs and the increasing demands of statistical science. The decision to acquire a medium-sized computer was reached after intensive study: A task force of Bureau statisticians, representing the various major subject matter users of computing facilities as well as the group responsible for statistical standards, scrutinized available equipment, current data processing requirements and projected future needs.

Historical Development

The history of data processing in BLS has been one of a continuous effort to transfer repetitive operations from clerical methods to machines as quickly as appropriate equipment advances permitted. These transferrable repetitive functions included judgmental decisions as well as matters of simple or complex routine functions. Because BLS surveys rely on sample returns, the initial emphasis in years past was on control of the reporting panel. Techniques were developed to control the current reporting panels and to identify respondents by comparison with data from a preceding period or with master control files. Later, techniques were developed to isolate reports carrying data of doubtful validity; once identified, these data were reviewed, corrected where needed and returned to the processing system. The latter technique can be stated generally as follows: Ratios were developed from the reported data and compared with similar ratios for preceding periods, with ratios for other reporters in the same cell, or with independent data or standards. Reports meeting the chain of tests, together with those which failed and were later

corrected, were included in subsequent processing to yield analytical tables and final copy which could be reproduced by offset printing processes in a published document.

The foregoing idealized pattern has been achieved with varying success — for some surveys it has been realized in its entirety, for some only partly or at varying intervals, and for others not at all. The Bureau's employment statistics program, however, illustrates some of the control and editing processes which have been developed over a period of years. Respondent reports in this program are initially submitted to a cooperating State agency which extracts data for its own needs and forwards the data to BLS in Washington. Since contacts with the respondents are made and controlled by the States, the Washington office does not know which reports have been submitted in advance of the actual monthly processing. The first machine operation, therefore, compares current report with those submitting reports for the preceding period. For matched reports, the data processing technique develops average hourly earnings, average weekly hours, and the ratio of production workers to all employees for both the preceding and current month. Ratios and averages for the current period are then compared with the corresponding figures for the preceding month and also against predetermined absolute criteria *(varying according to industry characteristics)* to identify questionable reports. These are removed for clerical scrutiny, corrected, and restored to the processing stream. The system summarizes the reports for the current period by industry, and prepares the current estimates and averages, which are shown on a printout table carrying all data for each of the hundreds of series.[1]

The extent to which the BLS developed the objective of obtaining correct end product data from the machines can be illustrated by a recent project undertaken for the Wharton School of Finance and Commerce. To base its consumer price statistics on more current expenditure patterns, the Bureau undertook a study of consumer spending habits. Upon completion of the primary objective, a substantial collection of statistics useful to business and scholars could be made available from the project records just for processing costs. The Wharton School of Finance and Commerce financed further exploitation of these basic data. Eighteen volumes, some 8,000 pages of consumer expenditure statistics, were published from this latter project. Significant sums were saved by photo-printing from machine printouts of data which summarized, reviewed and corrected input.

[1]For further details, see "Machine Methods in Employment Statistics," *Monthly Labor Review*, 1955, pp. 567-569.

Another general data processing technique which the BLS has initiated after several years of testing and development is the regular and routine acceptance and processing of data-carrying punched cards shipped from many machine installations outside BLS jurisdiction. The success of this venture grew out of the development of standard punched card formats, a uniform set of rules for the entry of data, and a system of close check on card alignment by both the sending and receiving agencies. About five years ago initial tests of the transmission of data adhering to these rigid requirements indicated that considerable savings in both time and money would accrue. In each year since then, more than a half million reports from cooperating machine installations throughout the United States have been included with BLS processed data just for the cost of shipping the cards. With no real difficulties encountered since its inception, the technique has succeeded well beyond the Bureau's initial expectations.

Imaginative data processing techniques were also developed to meet special problems not customarily considered within the capacity of conventional equipment. For example, a plan for securing a single solution to a 200th order input-output matrix

(continued on next page)

was devised. Ingenious planning of punched card format, combined with special sorting, collating, reproducing, and tabulating plans permitted the use of a floating decimal technique to obtain hundreds of coefficients of correlation when the large variation in size of the numbers involved would normally have ruled out the use of conventional machines. Also techniques for machine adjustment of indexes or aggregates covering extended periods of time to new benchmark levels were formulated.

During past years, the Bureau's progress in developing complex technical innovations in data processing was closely related to acquisition of improved equipment commensurate with BLS needs and resources. The Bureau has been using electromechanical equipment for data processing for some 25 years. Its first multiplier, crude compared to even the smallest modern electronic computer, was installed in 1934. In the postwar years the Bureau's machine unit acquired new and advanced conventional data processing machines almost as quickly as they became available and upgraded its operations accordingly. For example, old tabulators were gradually replaced by faster and more complex machines of more than twice the capacity. Obsolete mechanical sorters were replaced by high-speed electronic sorters and a small electronic computer *(IBM 604)* was added. The latter addition was particularly fortuitous. The machine was delivered to the Bureau in 1952 as replacement for several older mechanical multipliers. But BLS statisticians, uncovering its arithmetic, memory, and logical abilities, found that it had practically all the attributes of the then *"giant brain"* except reading and writing speed and memory capacity. The machine consequently forced Bureau staff to think in computer context and resolve many computer-generated problems such as the relationship between the clerical staff and computers, use of the machine to edit, etc., without being committed to a large investment. This was particularly true of the ponderous employment statistics program which was wholly reorganized around the device over a period of several years. As a result, most of the problems of staffing, procedures, and techniques to be met in accommodating that operation to a larger computer were considered before the question of acquiring a larger machine was confronted.

Ingenious data processing plans devised by imaginative technicians allowed the use of conventional equipment in ways which simulated some of the unique attributes of automatic electronic data processing machines. But the work was slow, computation planning complex and difficult, and machine limitations became more confining as the volume of work grew. The Bureau was satisfied that its technicians had exploited available facilities to the greatest possible extent and that the question of acquiring advanced equipment could be assessed with a clear understanding of BLS needs.

BLS Data Processing Requirements

To understand why a card input medium-scale computer was chosen, some knowledge about BLS data processing requirements is essential. The BLS data processing unit services a large variety of independent statistical programs covering a wide range of economic fields such as estimates of the number of dwelling units constructed each month and their characteristics, prices paid by consumers and manufacturers for goods and services, and employment, hours, earnings and turnover of wage and salaried workers, and so forth. The characteristics of respondents differ among surveys: Industrial establishments submit data on employment, turnover, industrial injuries, and wages; commercial establishments on prices; households on consumer expenditures; local governmental officials on dwelling units, etc.

BLS statistical programs are also varied in relation to timing, volume of reports, number of items collected on each report, and the extent to which data from a single survey are interrelated. For example, the employment statistical program, conducted in cooperation with 48 states and the District of Columbia, is the largest monthly sample of establishment reports anywhere. Over 112,000 respondents in public and private enterprises throughout the country provide data each month. The report itself, however, is quite simple. Only a few items are submitted — generally, total employment, number of production workers *(or equivalent)*, and total pay and hours for the latter group. This deceptively simple group of figures is processed by BLS Washington into a huge aggregation of over 2,000 published monthly series on employment, hourly earnings, and weekly pay and hours for over 350 U. S. industries, and by the States into an even larger set of some 13,000 published State and metropolitan area series. On the other hand, the BLS also conducts programs whose periodical occurrence is a year or more. For example, the National Science Foundation asked the Bureau to estimate the number of scientists and engineers working in the field of research and development and the cost of such work during several recent years. The results of these annual surveys were derived from a small sample of about 10,000 respondents but each report contained about 100 inquiries, related directly or indirectly in a variety of different complex ways. Other examples of differing time periods include the daily and weekly collection of wholesale prices and quarterly collection of data for the computation of industrial injury rates.

Another characteristic of most of the Bureau's

major repetitive statistical work is that its product must be timely to be of maximum use in shaping public policy and in informing the business and labor communities about economic developments. The consumers price index, for example, is used extensively in escalating wage rates as well as providing statistical intelligence regarding an important segment of the economic picture. Employment and hours worked data are widely used as an indicator of aggregate economic activity and for this reason are under an especially tight timetable — the data being released within ten days after the month of reference.

Almost always the Bureau's statistical product arises from the manipulation of sample data, and each survey has its own sampling plan and its own problems of controlling the reporting panel, editing the data received, assuring response and compiling the final statistics. One of the features of limiting study of universal characteristics to a relatively few representative cases is that this procedure, with given resources, provides the possibility for more careful examination, analysis, and correction, if necessary, of each case, than a census — provided the facilities for taking advantage of this feature are available. That is, computational devices and data processing procedures should permit careful examination of each case and more importantly, should select questionable reports and permit ready incorporation of verified or corrected findings in final sample records.

Additionally, for BLS work, the data processing complex should permit prompt and routine incorporation of the results of sample review in the end statistics, for often Bureau programs are linked together through time by comparison of current month data with preceding month estimates. In swiftly moving programs such as the Bureau's employment statistics program, a procedure which identifies erroneous reports without provision for immediate introduction of corrected data in the final estimates could not be tolerated.

A final characteristic of the Bureau's work is the great volume of sorting operations required for classifying data into appropriate economic and geographic categories for publication and for operational purposes as well. Sample control, editing, and related processes rely heavily on placing large quantities of data in sequence.

Selection of the Medium-Sized Computer

With the help of a background in the use of conventional data processing equipment and some important experience with a small electronic computer, the task force assigned to study the further BLS needs scrutinized available electronic computers of moderate and large scale. The group soon concluded the Bureau's work did not call for the latter type. Indeed, it agreed that the most productive facility for BLS would be a combination of its advanced conventional equipment surrounding and supporting a central computer of moderate size having the familiar punched card input and output. Such a unit would not, at the outset, include magnetic tape reading and writing units, but had to be adaptable to the modular addition of such units as well as magnetic core storage and other auxiliary facilities as the need arose.

The finding that the Bureau did not require tape reading and writing units insured the continuation of a carefully planned progression of the Bureau's data processing facilities. The transition from a combination of conventional punched card equipment including a small electronic computer to a system in which a medium-scale computer is the heart of the facility is believed to be substantially simpler when the punched card remains the medium of input and output; the step from punched card to tape creates a whole system of almost entirely new problems.

Moreover, the punched card, rather than being a limitation, provides the means whereby one of the principal objectives of the BLS needs can be met — namely, the need for flexibility and the opportunity for rapid and simple access into the processing stream to analyze input and insert corrections where necessary so that the resulting statistics include all supporting data. Experience with magnetic tape at other installations has shown that correction of input may not be feasible prior to the receipt of end product data, and, indeed is difficult and costly even after current processing has been completed.[2]

The punched card also provides a simple and direct medium of communication with small and moderate scale installations throughout the country. By means of the card the Bureau can continue to draw upon the vast amount of information previously recorded elsewhere without transfer to another data-carrying vehicle such as tape. For example, each month over a third of the 112,000 reports in the employment statistics program are mechanical transcriptions prepared from cards keypunched by cooperating state agencies for their own purposes. To meet the close timing of this program, reproduced cards are shipped by express to Washington where, without additional processing by BLS, they enter the processing stream immediately upon arrival.

Additionally, punched cards are easily and inexpensively sorted by high-speed equipment spe-

[2]For an analysis of the cost aspect of input media see "In Defense of Key Punching Systems," *Systems and Procedures*, November 1958.

cially designed for that purpose. An electronic computer is a superb and essentially inexpensive instrument for complex arithmetic and logical operations in great volume. When properly used it will often make many sorting operations unnecessary. However, when placement of substantial volumes of data in sequence is needed, the use of a large automatic data processor may become expensive. Because of the characteristics of the BLS surveys and their data processing requirements, the punched card may, consequently, remain the primary data-carrying vehicle even when tape units are added to further upgrade Bureau facilities at some future date. It is also possible, perhaps even imminent, that technical innovations will overcome tape difficulties. When this happens, the Bureau will, of course, reconsider its present evaluation.

Planning Data Processing

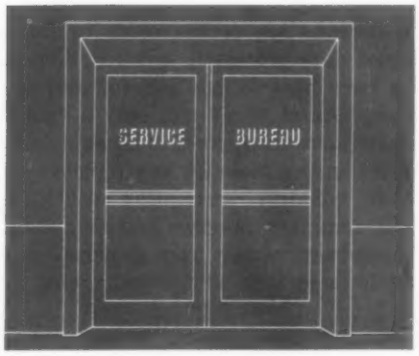
Review of plans for use of the automatic data processor reaffirms the findings based on conventional equipment — the imagination and resourcefulness of the technicians planning the processing are the controlling factors in the efficient use of any equipment system.

At the end of World War II when the Bureau's machine processing efforts were comparatively simple, consisting mainly of collating, matching, sorting, and tabulating to obtain aggregates, subject matter statisticians took little part in planning machine programs. A very general instruction or request was prepared from which the Bureau's machine tabulation division devised all of the necessary machine routines. As the complexity of the Bureau's statistical programs increased, as the science required more complex manipulation of data, as more powerful equipment was made available, and as clerical functions were transferred to machines, this simple mode of communication became increasingly inadequate. The Bureau's subject matter Divisions were forced to plan and to specify machine programs in greater detail. Staff members were trained *(often on their own initiative)* in the growing field of computational planning until today technicians in the major subject matter fields are one of the Bureau's primary resources for developing data processing plans. In addition, technician-programmers are an integral part of the data processing unit. These specialists assist the subject matter Divisions in developing and testing computational plans, and they also service and develop the necessary routines for other agencies using BLS facilities. In effect there is now a close and logical partnership of the subject matter Divisions and the central data processing unit.

The electronic computer is just one tool among a variety of machines available for data processing in BLS. In addition to intensive training for the computer, technicians having prime responsibility for developng data processing plans are also instructed in peripheral equipment such as collators, sorters, tabulators, reproducers, etc. Thus the person developing a computational program can consider various alternative approaches: The facilities and limitations of each piece of equipment can be given careful consideration and the most effective and least costly processing course can be selected. For example, projects requiring extensive sorting may be programmed through the comparatively inexpensive high-speed electronic sorters before the more costly computer is called upon to complete the project.

Another, and perhaps more important, advantage in placing heavy reliance on computational planning by subject matter technicians lies in program development. When intimate knowledge of machine processing is a tool of the statisticians the feasibility of various program alternatives can be assessed intelligently. Program objectives which might have been considered impractical are sometimes found easy with a well-balanced and integrated machine installation; and conversely, some proposed program objectives are rejected at an early stage when knowledge concerning their excessive machine running time or costs is brought into discussions of technique and procedure planning. ■

COVER FEATURE



SERVICE ORGANIZATIONS

What to Expect and What *Not* to Expect from "Service Organizations"

SERVICE ORGANIZATIONS fall into two main categories, *service bureaus* and *consulting organizations*. It is intended here to review the type and extent of service such organizations can give, and conversely, what a prospective user or client should not expect.

It is not our intention to rank these organizations—rather, it is our purpose to point out their common characteristics, responsibilities and facilities. A user of these services can profit as long as he is aware of how, when and where to utilize them.

Types of Service Bureaus

The companies comprising the first category—*service bureaus*—are punched card and computer data processing organizations. Several such organizations have branch offices in principal cities from coast to coast but the majority are local one-site companies. These companies offer a complete program of service to enable customers to attain their goals; problem definition, data gathering, systems design, processing flow and final reports are among the factors that constitute this program. The work processed may be a one-time job, or may occur monthly, weekly or daily.

With the advent of the computer many companies which have excess time available after their own requirements are fulfilled rent out time on their computers for a fee. This practice is especially true of universities that have received their installation as an outright gift from the manufacturer. In almost all instances where this situation exists there is little or no programming aid or assistance in problem definition. Also, definite equipment limitations to conform to the requirements of the company or educational institution must be borne in mind.

Positioned somewhere among the organizations described above are companies which provide temporary office help. These organizations fill a definite manpower requirement. Some of these are now providing personnel for data processing. In most cases this represents supplying key punch operators for conversion operations, peak loads and *"one-shot"* operations. Usually this personnel operates existing

By M. J. Sullivan

equipment in a company—often on a second or even third shift basis. These are the three types of service bureau organizations.

Service Bureau Facilities

Service bureaus are professionals in the field of punched card data processing services. Some of these companies have been in business for over a quarter of a century. As of this time, only a few of these organizations have computers. The equipment these organizations utilize includes key punches and verifiers, sorters, collators, accounting machines, reproducing and summary punches and calculators. Specialized equipment ranges from punched paper tape converters to large scale computer systems.

Schedules

Meeting schedules works both ways. A customer has a legitimate complaint if his work is not returned to him when and in the form specified. But very often a customer does not live up to his end of the bargain. At times a salesman *"blue skies"* the customer—makes impossible promises—though the customer does not hold the salesman literally the attitude generated by the salesman lingers. The customer thinks, *"I can get it there tomorrow and have it back yesterday."* A salesman can gather all the facts and assemble them but in conveying them to the people who are actually to perform the work he may leave something out. The customer may get something extra he did not want or miss part of what he wanted.

The other edge of the blade is squarely up to the customer. If he is instructed to have his data at the bureau and in a particular form—he should comply fully. A service bureau has schedules for other clients as well. If a customer is late, he should be willing to take his chances. In defining or outlining the job he should be especially careful to point out what he wants and what he will supply in data to achieve it.

Some Specific Benefits

It should be apparent that service bureaus with a backlog of talent can be of tremendous help in many phases of data processing. A new installation awaiting equipment arrival can begin its operations before the equipment arrives. This way, much debugging and finalization can be performed by the service bureau. There is nothing like actual performance to see how something will turn out. It provides a realistic training ground for personnel. Many associations are enjoying the benefits of using a service bureau for national conventions. They use punched cards as registration forms and the rest is taken care of by a service bureau. Registrations are printed overnight; in some instances, hourly.

Many conventional punched card equipment users, weighing a decision to convert to computers, can arrive at a realistic viewpoint of timing and costing, as well as programming an operation by test running it at a service bureau computing center. The usefulness of service bureaus for non-recurring or infrequent operations needs no elaboration here.

Cost Evaluation

It might be well to point out that in too many cases organizations which should be utilizing service bureaus do not. One of the prime reasons for not doing so is that too often they equate costs on an unfair basis. To wit, a company may feel that an estimate for doing a job in a service bureau is too high. However, if the company's own true cost for the same activity were properly evaluated, it might find the estimate more than reasonable. A service bureau must include their overhead, machine costs, payroll, employee benefits, training, etc. How many companies can honestly state they have compiled such thorough figures in costing their own operations? These are costs which a company must use in evaluating the service bureau's cost estimate.

Consulting Firms

The other general category of service organizations is the *management consulting firm.* This type of organization is equipped to supply specialists in particular areas of business management on a short term basis. Many of these firms have data processing specialists who grew up with the computer era. The cost for a business to staff its own organization with these specialists full-time would be prohibitive. In most cases, the need for such skill is not continuous. Data processing consultants are now a part of the management services divisions of some of the larger public accounting and auditing firms.

Summary of Factors for Effectiveness

When considering service organizations you should bear in mind . . .

- *Their reputation depends solely on customer satisfaction.*
- *Because of this, they must be attuned to individual needs and convert these into fulfillments.*
- *You, the customer/client, have obligations also, and adherence to these permits the smoothest performance of services.*
- *Where an unpleasant experience has resulted in disillusionment this situation is to be deplored and regretted. Still it is from the past that we acquire experience to guide us in the present and future.*

Service organizations have a definite and increasingly larger role to play in data processing. Their usefulness is now being realized by medium and small-sized organizations who would not ordinarily have the sustained need for such specialized assistance but who must call on it from time to time in order to compete more effectively for their share of a market. In these times of high rigid production costs, profits must be sought in the marginal area of operating costs.

To this end, data processing service organizations are oriented. ■

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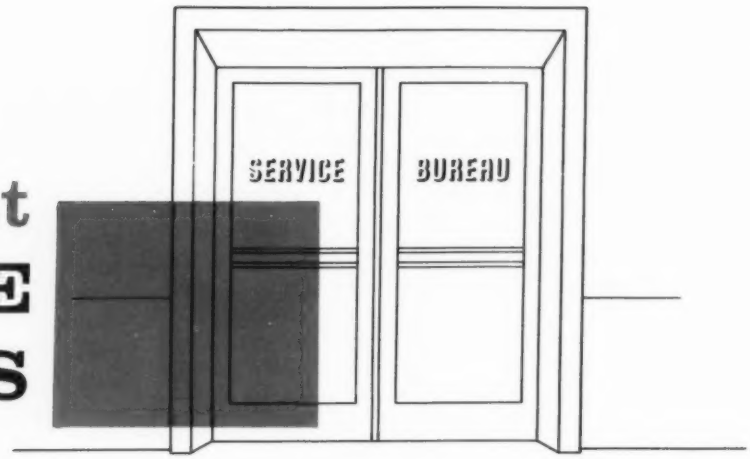
IBM SUPPLIES

A Look at SERVICE BUREAUS



Common Characteristics of a Service Bureau and Some Particular Case Studies

What is a Service Bureau?

ELECTRONIC DATA PROCESSING SYSTEMS have been installed in sufficient numbers and applied to a wide enough range of jobs to convince their users that they are a big step forward in business management. For the most part, these advances have been made by the managements of larger organizations. Volume operations, the availability of specialized staffs and the natural tendency of manufacturers of data processing equipment to study problems in concentrated market areas first contributed to the early data processing gains made by the largest corporations.

This situation, however, has accelerated the demands from managements in smaller companies for similar benefits—for systems geared to their volume and needs.

One result has been a relatively recent increase in the development of smaller capacity computers and data processing systems, and these have found ready markets in many instances. A far-reaching observation, however, is that, generally speaking, the more versatile the data processing system, the more useful to management and the more economical are the results it produces. Thus, many organizations have found greater benefits in utilizing, on a less than full-time basis, the larger capacity equipment available through service bureaus, rather than to install limited capacity machines in their own offices.

Data processing centers now are available in every section of the country. These centers are equipped with a comprehensive line of machines, usually from one manufacturer. Their staffs are well trained and include mathematicians, methods analysts, and highly qualified operators—a far cry from the typical machine service bureau of ten years ago.

These data processing centers are used by business executives, scientists, and engineers. Jobs range from a one-time physical inventory calculation to a complete payroll or production control system.

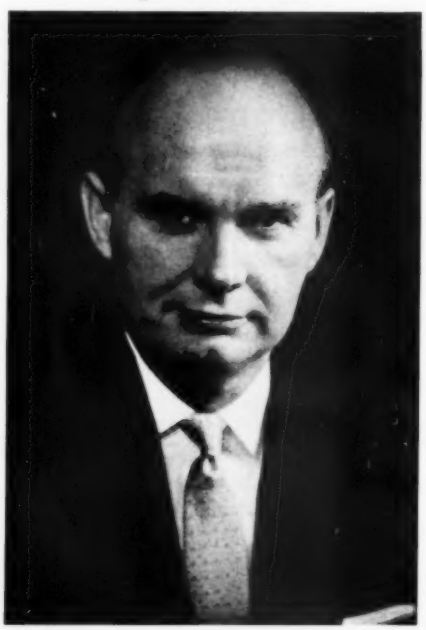
More and more the sub-contracting of data processing to outside specialists is becoming an accepted business practice. Its advantages are as important as those long associated with the sub-contracting of manufacturing production.

Smaller companies, on the whole, have been slower in improving office operations and realizing benefits from high-speed data processing. With the availability of service bureaus where applications can be tried out, procedures perfected, and new reports developed on a time or volume basis, however, this inertia rapidly is being overcome.

Who Uses a Service Bureau?

Generally there are four categories of users who

By O. M. Scott



can benefit by utilizing the services of a data processing service bureau:

1. *Organizations whose volume of paperwork does not justify economically a machine installation of their own.* Some of these companies may have a one-time requirement for analysis of sales or market study. Others benefit from high-speed processing on a recurring basis of their payrolls, inventory or budget reports. A significant percentage, for example, of the more than 10,000 different organizations who used the facilities of The Service Bureau Corporation last year are in this group and include insurance agencies, schools, hospitals, union locals, small manufacturers, medical clinics, dairies, banks, mortgage companies, independent telephone companies and other smaller utilities. For these organizations our company produced payrolls, budget reports, inventory reports, and virtually every other report or management analysis used by their larger counterparts. For example, the company is preparing complete payroll and labor distribution records for the major hospitals in one eastern city. By standardizing on the basic forms and *"batching"* or *"pooling"* their source data, each of these hospitals is benefiting from the economics inherent in volume-processing—and receiving a management service unavailable to them except through the service bureau approach. For these companies and others, a task that ordinarily requires months of tedious manual work is now done in hours—and for less than the former cost.

2. *Organizations whose volume of work may be sufficiently large to support a machine installation of their own but who want to pre-prove the economics of such an installation.* To these organizations, a service bureau offers the most practical means of testing applications. For a minimum investment, the service bureau assists such companies to determine by actual experience the advantages and limitations of data processing automation—from the standard punched card line all the way up to large-scale computers. During the past year, the staff of one of our data processing centers worked very closely with the methods staff of a well known petroleum company uncertain as to whether they could justify their own computer. They had some rather difficult applications that required several hours of computer work each week. We ran a number of tests on these applications, and the excellent results proved that they should have their own computer. They have one on order now.

3. *Companies whose investigations have already proved the economies of data processing automation and who are actually preparing for their own installations.* To these organizations, a service bureau offers a wide variety of library programs, *"debugging"* facilities, and the methods experience gained from years of practice and the widest range of activities. Recently, for example, our organization assisted a wholesale food chain to prepare for their in-line data processing equipment installation. File conversion, physical inventory balancing, random access file assignments and other preparatory work by our branch office made possible the profitable installation of their new in-line data processing system weeks sooner than would have been possible without this assistance.

4. *Organizations who have their own machine installations and who find it expedient and economical to use service bureau facilities for special reports, to eliminate peak load operations, or for selected repetitive applications.* This group includes these companies who utilize larger-capacity or more sophisticated service bureau equipment for some types of work than they find profitable to maintain in their own installations. In one instance, a life insurance company recently was faced with an unexpected complex premium distribution analysis which had to be accomplished on very short schedule. They called in the staff of one of our branches late on Friday afternoon. The program was written and *"debugged"* by our people that same day. Processing took place on Saturday and Sunday in our office, and the completed reports were on the vice president's desk on Monday morning.

In another case, the parent company of a gear manufacturer suddenly requested a special inventory report. Their most optimistic estimates, using only their own punched card installation, required a four week schedule—three weeks beyond the requested deadline. We took over the job and produced the finished reports in three days.

Recently, a national corporation established an advantageous procedure that utilizes our facilities in several locations to prepare reports for their branch offices. Resulting summary cards are sent to their home office data processing installation for consolidation. This plan has speeded up the time schedule on their final reports and provides more timely and useful information for their branch managers.

Defining the Problem

The effective use of a service bureau depends to a great extent on the proper definition of a problem or desired results. When a business executive presents a poorly defined problem or a nebulous request to his service bureau, he can logically expect the same inefficiency to carry through to the final results.

Defining the problem is relatively easy if the results desired have been accomplished before by manual means. When the results required, however, are new, problem definition can be a much more difficult matter.

In this situation, service bureaus often provide a very valuable management service by contributing long experience in machine technology to the customer's knowledge of his own business and the results he needs. Such technical knowledge in our company, for instance, is not limited to the staff in any single location but rather is drawn from long experience of many methods people throughout the country.

After the job has been defined, the service bureau will prepare a proposal consisting basically of the results and an estimate of cost. Five fundamental steps are required to produce this proposal:

Step 1

The service bureau representative working closely with the customer gathers all the facts—source data, required results, and time schedules.

Step 2

Methods analysts then decide on the basic approach to the job.

Step 3

A flow diagram is made to determine the procedure steps required. This diagramming will show where standard programs or procedures can be used.

Step 4

An estimate of processing time is made.

Step 5

Machine loads and scheduling must be studied to determine the starting and completion time.

Results

The data processing service bureau offers unique and very worthwhile advantages to users:

1. *Results are known in advance—and costs are guaranteed.* This is particularly important for the customer who has had little previous experience with electronic data processing.

2. *No investment in equipment or facilities is required.* The service bureau already has made this rather sizable investment—with trained crews and experience, it is geared to use the facilities efficiently and thus make them pay off.

3. *Benefits can be obtained quickly.* When it is determined that electronic processing will produce benefits, the fastest way to realize these benefits is through a service bureau. Waiting for equipment delivery, recruiting and training a staff, converting procedures may take many months—even years.

4. *Wide methods experience provides a valuable management service.* To the staff of a service bureau who are used to handling hundreds of different applications each month for many different kinds of companies, determining quickly the best machine procedure for any given job is a routine function. High machine utilization and operating efficiency are a normal part of operation. To customers this means more effective reports, efficient machine procedures, and tight time schedules.

Conclusion

Perhaps the most significant contribution of service bureaus to effective management, however, can be found in the rather unique relationship of results produced to the costs of production or value of the results.

In most organizations—regardless of size—clerical operations or machine-produced results often are lost in the general overhead and enjoy deferment from the rough-and-tumble analysis of break-even points.

But the moment these same results are turned over to a service bureau, they bask in the bright and clear exposure of critical comparison between value or result and cost of production.

Results produced by a service bureau stand on their own. They produce a profit, gain time, increase accuracy, or reduce costs—or they do not exist!

In our experience, the first time many a business executive really has known what it cost him to produce an invoice, prepare a paycheck or compute his inventory is when he compares his internal costs for these results with the price for similar results produced by his data processing service bureau.

Yet, self preservation dictates in these days of diminishing profit margins, that every business organization must continually seek better management tools and lower operating costs. This is particularly true in the case of small business where the average net income after taxes is only about 2.5% and where $100 saved in overhead is equal to over $4000 in sales!

Service bureaus offer the most readily available source of assistance to these organizations. To the larger organizations they offer forward steps in efficiency on a practical and pre-proved basis. To the largest in industry, commerce, and government, they offer a new dimension in flexibility and convenience.

■ ■ ■

The Case for MANAGEMENT CONSULTANTS

Questions and Answers That Will Settle Many Doubts

OVER THE YEARS, I have been asked and have answered many questions about management consultants: *who hires them — why they should be hired — what benefits can come from their efforts — why my firm rather than one of the many others in the field should be retained, etc.*

The answers to these and other questions are what I have termed *"The Case for Management Consultants."*

Who Hires Them?

A recent study by the American Institute of Management for the benefit of its members tells them that many of the country's largest and best-run companies are the steadiest clients of outside consultants — and that it is estimated that three out of four clients thus served come back for more advice and help after being served once. There is also a fast growing trend among medium-sized and small concerns, many of whom had formerly felt that they could not afford it, to enlist such outside help. Generally it is not the sick firm that hires a consultant. It is more often the healthy firm interested in maintaining that status, providing in effect *"health insurance."*

Why Not Hire Management Consultants?

A reason frequently given is that management's problems should be solved by management itself — which is all well and good providing management can solve all its problems. But when it can't, there's no more reason for letting them go unsolved than there would be in clumsily trying to design a house for one's self without the knowledge of architecture, or in refusing to call in a doctor for a chronic ailment. No single individual nor firm combines all perfection in every field of endeavor, nor can such talent be steadily kept on the payroll for special occasions. That is where the consultant comes in.

Other reasons frequently given against hiring a consultant are that the risk of disturbing company personnel outweighs the advantages. That when an outside concern comes in and studies a problem and irons it out, it is he, and not the company executives, who will gain the valuable knowledge and experience. And that when the consultant leaves, the organization may be unable to properly follow his recommendations, or to operate the new installations at top efficiency.

The carefully chosen consultant will work closely not only with top executives of the client firm, but also with the people who will eventually carry out his recommendations. He will gain their respect and confidence early in his work among them so that the employees will not face the proposed system changes with the characteristic resistance of human nature, an attitude we know all too well. The skillful consultant will draw workers into a feeling of participation in planning for the change. As the work progresses he will take pains to see that they thoroughly understand each step; and when the changeover is complete, and the installation in working order, both management and consultant will have the satisfaction of knowing the employees have been trained to operate at maximum efficiency.

By G. S. Murphy

But of all the arguments I have heard against the use of management consultants, the most frequent one is that they are too expensive.

This may mean either that they are too costly for a small or medium-sized business, or it may mean that the concern feels all consultants overcharge. Obviously, even a very small business can afford a management consultant who effects savings greater than his charges. I have generally felt that any company with a payroll of $50,000 annually can afford to employ a consultant if it feels the need of one.

How Much, Though, Do Consultants Charge?

That depends very much on the level of consulting work required and the amount of time needed for a particular job. A serious problem which calls for the attention of the consultant firm's top man will, of course, be more expensive than a more or less routine problem which can be solved by a service technician on the staff whose background and experience fit him for this particular type of work. Ordinarily, in this line as elsewhere, the client gets pretty much what he pays for. Consultants have nothing to sell but time, knowledge and experience.

Fees are generally standard among firms. A top partner in a large consulting firm may charge $250 a day, but is confined to operating on a top executive level. The most usual fee for a competent staff man is $100 per day, and a junior member of the staff, sufficiently trained to have his time billed, might receive $80 or as low as $50.

This may seem like a lot of money, but let's examine it further.

As an employee of a company, part of your salary and the overhead of your office are taken into consideration in setting the price for the product or service your company sells. The same thing has to be true of the consulting firm. Fees for staff members cannot be based, for example, on full time performance. For one thing, there is a lot of time lost in transferring from one job to another. In addition, there is training time for special assignments, and the initial training which must be given new men.

For purposes of discussion, let's suppose that you have decided you need a consultant.

Which One Do You Hire?

This may seem a formidable assignment, similar to the situation you would face if you needed the services of a medical specialist and had no regular doctor to guide you to a good one. Moreover, unlike medicine, law, or any other older, longer established professions, there are no comprehensive self-policing mechanisms to insure that wholly unqualified practitioners are barred from operating.

There have been some poor performances by consultants. There are quacks and bunglers in every business, and a number of companies have been misled by them. However, the great majority of management consultant firms are honest and reputable — but you can't take any firm for granted. It's up to you to check the firm's general standing, its particular qualifications for the job you want done, its methods of working, and its ability to get along with people, before you entrust to it the important work of systems revision in your company. It means hyper-caution, checking in every way you can, and the combining what you have learned about the firm with your own impressions of the firm's personnel and its approach to your problem, before definitely committing yourself.

If you know no firms at all that are qualified to plan and direct system or organization revision for a company like your own, there is a certain sequence of moves you can follow to get leads.

You can consult the bibliographies of published material to get the names of consultants who have done a good deal of writing on the subject. You can read their articles and form your own judgments of their thinking, the work methods, and the results described in the article.

Invite each of the consultants whose work has impressed you to send a representative to discuss your project with you. Ask him for the names of former clients, and don't hesitate to check up and find out how well satisfied those clients have been. Visit the companies where the systems have been installed, so you can see them in operation and talk to those who use them.

And be sure, in making your final choice of consultants, that you like the person assigned to your system revision—be certain he is the kind of man with whom you will want to work.

What Are the Phases of a Consulting Job?

A consulting job is usually done in three phases or steps. First, an initial survey to determine what is involved in the job and what should be done; how long it will take and how much it will cost. This phase is short, running from a few days to a few weeks dependent on the size of the job.

The second phase of the work is the analysis itself. This takes longer. On a large job it may run eight or nine months, and sometimes up to a year or more. On most jobs, the study can be made in from two to six months, and is frequently less than that. This phase of the work is climaxed by a report, usually written, presented to management. And, if management approves the proposal as worthwhile, and gives the go ahead signal, comes the third phase—the installation.

The consultant's duties in the installation of a proposal consist of doing everything that is needed to make sure the proposal becomes a reality, and that the cost approximates the estimates.

Where an installation does not come close to the

stated estimate, the consultant must either explain it to the satisfaction of the company's management or risk an unfavorable reference — something no consultant can afford.

Another frequent question is, *"Just how do you propose to go about analyzing a company or a system?"*

The analysis of a system is itself divided into parts. This is not necessarily a simple step-by-step progression. The steps may overlap, be done in a different order, or some of them may even be omitted. Briefly, these are: *study of the present system; analysis of present costs and volumes; design of improved system; determination of proposed costs; and report and presentation of findings.*

The first step in system planning is to find out what is actually being done — each department's work must be placed in context with the work of all other departments. Once an over-all picture is obtained of the actual functioning of the present system, the job of pruning, correcting and redesigning can begin. Furthermore, a clear picture of the present methods will help to point up the specific requirements and objectives needed to meet the new design.

The planner must do the whole job of analysis. He should analyze each department individually and chart its flow of work, department by department, building a total picture of the operation. A good consultant will not only take into account the facts relating to the company's functioning, but the intangibles as well, the most important of these being human relations. When all is said and done, it is people — not machines — who run an office, and they will be the ones who will put changes into effect. It is therefore essential that the consultant be able to evaluate the personnel and gain their confidence and cooperation for the success of his proposals.

The second step is to identify the specific objectives which the client wishes to achieve. All proposals are tailor made to the requirements of the client company. Whether it is a new system or organization, neither can come out of a book. As pretty as some of the illustrations found in books are, as long as people remain individuals with individual capabilities, and are part of business, each proposal and installation must be designed to realize the maximum benefits of those capabilities.

Once these steps have been accomplished, the consultant is ready to plan and cost his proposals. Planning is creative. There can be no routine program reports at this stage, for it will be concerned with all possible approaches to the problem at hand. The final plan may be unorthodox—that's all right too, as long as the plan promises to fulfill the objectives efficiently.

And lastly, the question I wish had been asked, but never was:

What Shouldn't I Expect from a Consultant?

Do not ask the consultant for opinions on phases of the operation not included in his assignment. Besides taking time and thought from the main line of the survey *(which he is trying to complete within the time schedule he has set)*, it is unfair to throw in additional problems beyond the agreed upon scope of the survey. His only product is the sale of the time of himself and his staff men; therefore, if you want an evaluation of an additional problem, expect to pay for it.

Do not ask for his recommendations before the time calculated by him that he will require.

Do not expect the consultant to reveal the sources of some of the information he has obtained about your company *(even though you would love to know where he had found the skeletons)*. You cannot expect him to betray confidences given him by your personnel any more than you would expect him to reveal information of a confidential nature from one of his other clients.

Don't expect him to agree with you if he feels your ideas are unsound. You are not paying good money for a *"yes"* man, but rather for an objective decision based upon his knowledge and experience.

Finally, just because a change of system might be installed and a manual written, that is not the end. After the consultant leaves, you must see that the changes stay in effect. The magnetism of old habits dies very slowly.

So that is some inside information on the manner in which consultants operate. And more of us are operating in more clients' businesses every year. A recent estimate indicates that there are some 1700 firms operating on a full-time basis, with annual fees of approximately $200 million. Further, many firms have overseas branches serving foreign clients, indicating that foreign management, as well as American management, is obtaining valuable aid.

Yet, when asked what is a management consultant, I have never been able to do a good job of giving a short, comprehensive answer.

Primarily, the successful consultant is a man of broad background and experience in the specific areas in which he and his firm offer their services. He brings to his clients' problems objectivity without prior prejudices and the assurance that client satisfaction is the only way of maintaining the reputation that is his chief business asset.

In no instance is he a medicine man operating by mumbo jumbo; his thinking is always a logical development from problem to solution.

His talents are at your service. His continuing success is your guarantee of a job well done. ■

Data Processing FORUM

QUESTION-"What are some of the Considerations to Be Faced by Educators?"

**Vincent H. Jones,
Division of Commerce,
Southern University,
Baton Rouge, Louisiana**

THE EVER INCREASING DEMANDS forced upon the school of business by industry have created certain problems which require extensive evaluation. With the evolution of automatic data processing equipment, the "so-called" manual methods of bookeeping and accounting are gradually being shelved along with the abacus.

Some schools of business have solved the problem by literally ignoring it. Encouragingly, others have met the problem head-on by attempting a solution. Immediately, they are faced with the task of placing data processing in the business administration curriculum. Certain thought-provoking questions raised in this attempt are:

1. What professor on our staff is qualified to teach data processing?
2. What machines should be taught?
3. Who should receive training in this area?
4. When should they receive it?
5. What are the costs involved?
6. What alternatives exist?

In an attempt to offer solutions or answers to the questions, attention should be devoted first toward professorial training and machine costs. It is evident that there are two alternative solutions existing for both of these. In the main, both IBM and Remington Rand have instituted three-week summer training programs in data processing for Business School professors.

With reference to cost of machines for a basic or introductory course, dollarwise the figures range from $150 to $500 per month, depending upon speed and diversity of machines. On the import of costs, it has been the feeling of most business school administrators that industry should bear such cost through increased rental/purchase prices on their part, since all benefits accrue directly to them.

In turning our attention to the curriculum, we must first agree that such a course should be offered as near to the source of use as possible. Authorities in the computer field generally sanction the idea of immediate practical application. We should, therefore, think only in terms of the senior year for the bachelor level and the second year for the master level.

**Dr. Dennis Phillips,
Director of
Management Institute,
New York University,
New York, N. Y.**

A FREE SOCIETY finds its strength, its creativeness and ultimately its spirit in the ability of its members to determine their destiny according to their talents and the efforts they are prepared to make. It is important for each of us to know what kind of contribution we want to be making in the profession that will give us the greatest satisfaction five, ten or twenty years from now. In defining the goal it is important that we have a plan, an understanding of the kind of professional services we are willing to contribute. We must also know which of these goals will be increasingly important in the future.

In this regard we must have a clear concept of the developments which are taking place in pro-

fessional management today so that we can undertake the kind of self-development as supervisors, executives and managers that will prepare us to give advice and counsel to those who are working with us. In the future we are going to hear a great deal of the term "professionalism" in management. This "professionalism" is an outgrowth of the complexity of business and industrial management and of the importance of improved decision-making.

In developing this professionalism, it is recognized that the particular areas of management specialization in our association, integrated data processing, punched card and electronic data processing, are going to achieve infinitely wider application in the total management decision-making process.

There was a time when education was considered primarily terminal; to some it ended with high school, for others it ended with a baccalaureate degree, and for a few a higher degree. Today in this area of technology and electronics, when the security of the nation is being challenged, it is perhaps more important than ever that we look to more definite goals in education. ■

An Independent View of DATA PROCESSING

The Complexity of the Field Demands a Learned and Dispassionate View

By J. F. Fisher

THE TERM "DATA PROCESSING" covers a multitude of things. In our definition, the term includes conversions, written communications, use of a pencil, pen, telephone, abacus, adding machine, slide rule, visible index cards, computers, accounting machines, or scratch pads. Mature business judgment must be brought to bear on the selection of methods and research into the use of new and improved equipment. A disinterested review should precede any selection of means from the bewildering array of competing methods. Only thus can a business executive assess relative merits and pitfalls of each method.

In spite of the rapidly expanding body of knowledge in data processing, the communication theory is becoming better understood. Communication models can be devised by means of which complex situations can be analyzed. Management is becoming better aware of the common denominators whether in church, government, industry or the military. The first objective in any analysis is to formulate the objectives of the organization. Can they be expressed? What are the points at which decisions direct an organization toward or away from these objectives? What are the origins of information? Where does it have to go in order to contribute toward a decision? Should the information stop there or go elsewhere as well? Is it going too many places? Is there too much communication? Do the channels of communication and the form of communication from the source lend themselves to common use by operating management, financial management, general management? Is the whole flow actually used or is some of it best left at the source?

The Model

The model of an organization may look like a water shed with each tributary flowing toward the central stream upon which are borne the objectives of the organization. Each fork can be considered as a point of decision and possible destination for a bit of information. How soon must the information reach the fork? If this is a point of decision, how is the decision communicated to accomplish action? The closer the point of decision is to the point of action, usually the less time and the less distance both the information and the decision must travel. The quicker corrective action can be taken to achieve control, the less waste and opportunity for error will be experienced. This simple principle needs to be kept constantly in mind in systems design. Often the most efficient centralized data processing system will introduce a time lag in the decision-making process that is

far more costly than the saving achieved through centralization.

Communications

A communications model should provide for engineered performance standards. A comparison of present performance to past performance has some degree of value in detecting radical changes in current operations. This method, however, fails to measure current performance against what should be accomplished when all controllable factors are optimized. The executive who has the best operation has the hardest task of effecting improvement. Many opportunities for improvement escape attention because the area for improvement has never been a problem. Administrative effectiveness can be greatly enhanced from an operating financial and management viewpoint by an overall design for information flow. Control reports should indicate trends and relate such trends to long range plans. Development of a communication model calls for an extensive background and understanding of a particular business. It is usually better to train company personnel, who possess such background, in what they need to know about data processing, than it is to train data processing experts in the complexities of a particular organization.

Once the communication model has been developed so that we know exactly what information must flow, where and why, we then are in a position to decide how and when it needs to flow. Communications can be faster than necessary. One manufacturer developed a beautiful communication network throughout the country and belatedly decided that getting information within a few hours did not result in any better decisions than if the information had been received in the old 48-hour period. The difference in cost to knock the time down from 48 hours to 4 hours was $200,000 annually.

On the other hand, another industry may profit considerably by spending $200,000 to cut 48 hours from the flow time. Another company cut 12 hours from order flow time and was able to make deliveries a week sooner than its competitor. The Sales Department feels this competitive edge is worthwhile and the system paid for itself in clerical savings over the old system, although this was not the objective. How valuable is time? What decisions can be made better if facts are known quicker? How much better? How much are we justified in spending to achieve speed?

The Best Timing

The question of exact timing is something that cannot be overemphasized. Too long a delay may be costly. Gaining speed for a price may not be worthwhile unless the speed can be used to advantage. These questions and their alternative answers require mature and experienced judgment.

The question of how to do something has been answered by an existing system, one that is already in operation. The system may have evolved without asking the question of how best to accomplish the operation. Even when making changes, the question of *"how"* may have been asked only by an equipment or forms salesman with a very ready answer, his answer. Sometimes the ready answer is selected without consideration of all the alternatives. For example, an assignment to *"put production control on punched cards"* was rephrased to *"improve the overall performance of production control."* The company had volume and timeliness problems. The complexities of exploding the parts list, sometimes found in production control, did not exist for this company as the products were relatively simple. Better timing and economical processing with a manual system was the proper solution at the current stage of this company's development.

In the near future, in this same company, the production control procedure will be on a computer. The computer will improve the timing over the manual system. The savings in time can be profitably used. If they had gone to punched cards three years ago, the results would have left a sour taste for all automatic data processing for that company and a step forward would be less possible in the future.

Mathematical Models

The complexity of the problem to be solved is another major consideration in the determination of its solution. There are some data handling problems that never were satisfactorily solved until the mathematicians developed analytical models and computers provided the practical means for solution. A great deal has been written on mathematical programming and the wonders of the computer. But if an analysis of the communications model demonstrates that the gaining of a day or a week is not too important in decision-making, and the problems are not so complex as to require the memory and calculating powers of the computer, then the method selection depends more on simplicity, economy and ability to expand and above all to contract with the changes in fortune to which our economy is subject.

Business is sometimes subject to as many fads in management as fashion is to fads in hats. But deciding upon the systems and equipment which best fit a particular organization's requirements requires more research than just looking about to see what everyone else is doing. The system must be engineered to fit the need, taking full advantage of the vast array of excellent tools which the data processing industry has provided.

The human problems of administering change must be carefully considered. The individual responsible must be able to teach new skills and inspire faith in unfamiliar methods. A glance at the logarithmic growth curve of the planet's population indicates the terrifying pace at which communication problems are accumulating. The data processing field is none too quickly on the scene with its miraculous hardware and imagination. Much will be required of those to whom so much is given. ■

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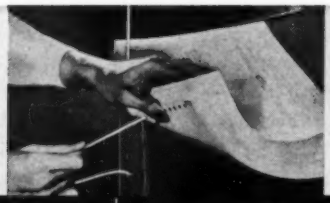

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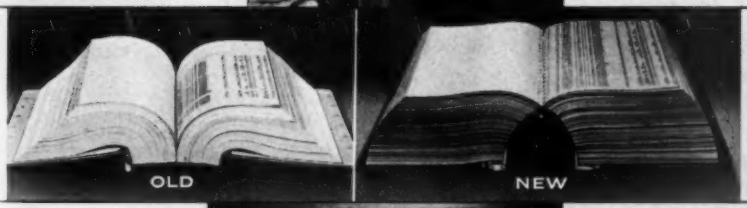

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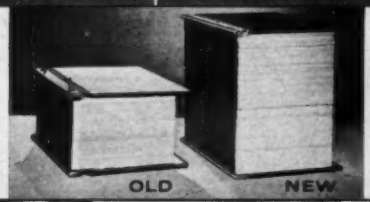

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AUTOMATED PRODUCTION CONTROL

Basic Considerations To Be Carefully Viewed Before Automating This Application

Definition

MANUFACTURING CONTROL consists of activities of planning ahead, executing on the basis of a preconceived plan, and finally evaluating the results of material conversion. Questions as to when to reorder, how many, in what economical quantities, what manpower and machine times are represented by these requirements, when each machine operation should start in order to meet schedule obligations, how much raw material is required and at what specific times, must all be resolved in order to efficiently control production.

It is my belief that punched cards, under certain conditions, can be of tremendous value in assisting production managers to solve these problems.

Even in the various areas of Production Control in which punched cards have previously been used successfully, the decision to automate should be of a very conditional nature depending entirely upon the specific array of production problems with which any organization is faced. Those manufacturing firms, for example, whose products are normally custom-made or composed of relatively few component parts, whose production requirements cannot be projected with a fair degree of accuracy, whose engineering specifications fluctuate continuously and whose output is strictly low volume, will have considerably more difficulty in justifying automation techniques.

At Pitney-Bowes

Pitney-Bowes, Inc. "builds to consignment" approximately forty basic production models, alternating them usually in sizeable lots on three main assembly lines. Nearly twenty thousand component parts are used in producing these units, many of which require lengthy and complex manufacturing techniques; production schedules for this reason must be projected through a substantial period of time. With the exception of some new models, we have been producing the same equipment, with some engineering variations of course, for a prolonged period giving us the added advantage of good historical data in estimating our scheduling requirements.

Usually the most salient factor influencing the decision to change a system will lie in whether management feels that the information supplied to them is adequate, timely and accurate. Our own analysis revealed several inadequacies, most important of which were the *(a)* length of time required to complete the planning phase of the ordering process, *(b)* inability to reflect schedule changes due to the number of man hours required to select and update the orders to be revised and *(c)* inability to rely on manually updated machine loads without overly time-consuming self-checking operations at frequent time intervals. The reason for both the excessive time element required to reflect production requirements on documents used to control the production process, and our inability to reflect all important schedule changes, was largely due to the more than forty separate manual operations of recording, sequencing, computing, summarizing, filing and reporting of data extracted from the fifteen to twenty thousand operation cards

By D. L. Coates

which we process each month. The problem of inaccuracy can also be related to the complexity and volume of processing, as accuracy will tend to decrease in relation to the total number of times in the process in which the human mind has some effect on the results.

After Study—Decision

The decision to automate should also be influenced by the extent to which it becomes necessary to adapt identification coding systems to punched card requirements. Our company was fortunate in this respect inasmuch as the codings for parts, machine load centers, operation numbers, etc., previously established to facilitate engineering specifications, fitted in well with punched card requirements; namely, to establish condensed codings, preferably numeric, that would overcome the number of digit limitations usually prevalent in processing punched cards. Those of you familiar with this problem know that requirements beyond 80 or 90 columns of information must be handled on a less efficient multiple card basis. We did, however, find it necessary to reduce lengthy raw material specification descriptions to a seven digit code. These seven digits identifying raw material as to type, shape, size and temper have been invaluable in the preparation of raw material requirement reports. It is sufficient to say at this point that extensive coding requirements can add substantially to conversion costs, an area frequently overlooked in the economic justification of tabulating equipment.

Basic Procedure

The automation process in our organization started with the preparation of fixed or constant data used in preparation of production documents. The first of our two master decks, the master bill of materials by model, assists us in resolving the question as to what should be ordered, and when used in conjunction with inventory levels and monthly production schedules, enables us to determine the points at which certain phases of material conversion should be completed. Variable data such as shop order identification, quality, due date, and lot number, when keypunched into variable order cards and interfiled with corresponding reproductions from the remaining master deck of machine operations and material requirements for each part, assists us in establishing in a single machine *"pass"* standard hours required, start dates and quantities of machine operation, raw material requirements and material requisition dates. These master decks are put to many other varied uses throughout the year, the most prominent of which are standard cost determinations, preparation of finished parts withdrawal requisitions and model listings for lot study analysis.

The Computer and the Key Play

Our small computer *(monthly rental $750)* plays a prominent role in setting up what might be considered the *"key play"* in our operation. This machine executes 3200 scheduling instructions per minute selecting information stored from both previous and present card computations, present card input or constant input. It stores initially, for use as each successive operation card enters in reverse order *(last operation card first)*, the quantity, lot number, shop order number, and due date of the part or sub-assembly to be scheduled. Utilizing the standard rates carried through from the master deck, it then establishes standard hour requirements, converts this to decimal work weeks, adds a move-time factor, sets up the start date by subtracting work weeks from the start date of the operation card just scheduled, and finally computes and schedules material requirements by carrying the start date of the first operation card and the product of the quantity times material weight/pc. into the material requirements card.

Further automated processing of these reproductions through sorting, reproducing, summary punching, and tabulating machines provides the basis for updating summary machine loads, issuing raw material, and routing information to the machine shop at the appropriate time, maintaining work-in-process progress reports, and for generally assisting shop foremen in maintaining the proper flow of material through their respective departments *(see accompanying flow chart)*.

The re-scheduling problem has been largely overcome through the use of punched card equipment. Within a small fraction of the time previously required, we can mechanically segregate shop orders assigned to a specific production lot, re-schedule them by correcting the due dates and adjust machine load summaries and material requirement dates to reflect the schedule changes; all this, I might add, with a decided increase in accuracy. We've lengthened the time interval between re-summarizations of machine loads for self-checking purposes to once a year, as experience has shown the error factor within this period of time to be negligible. The checking process itself has become a mechanical one, requiring a small fraction of the time required under the manual system.

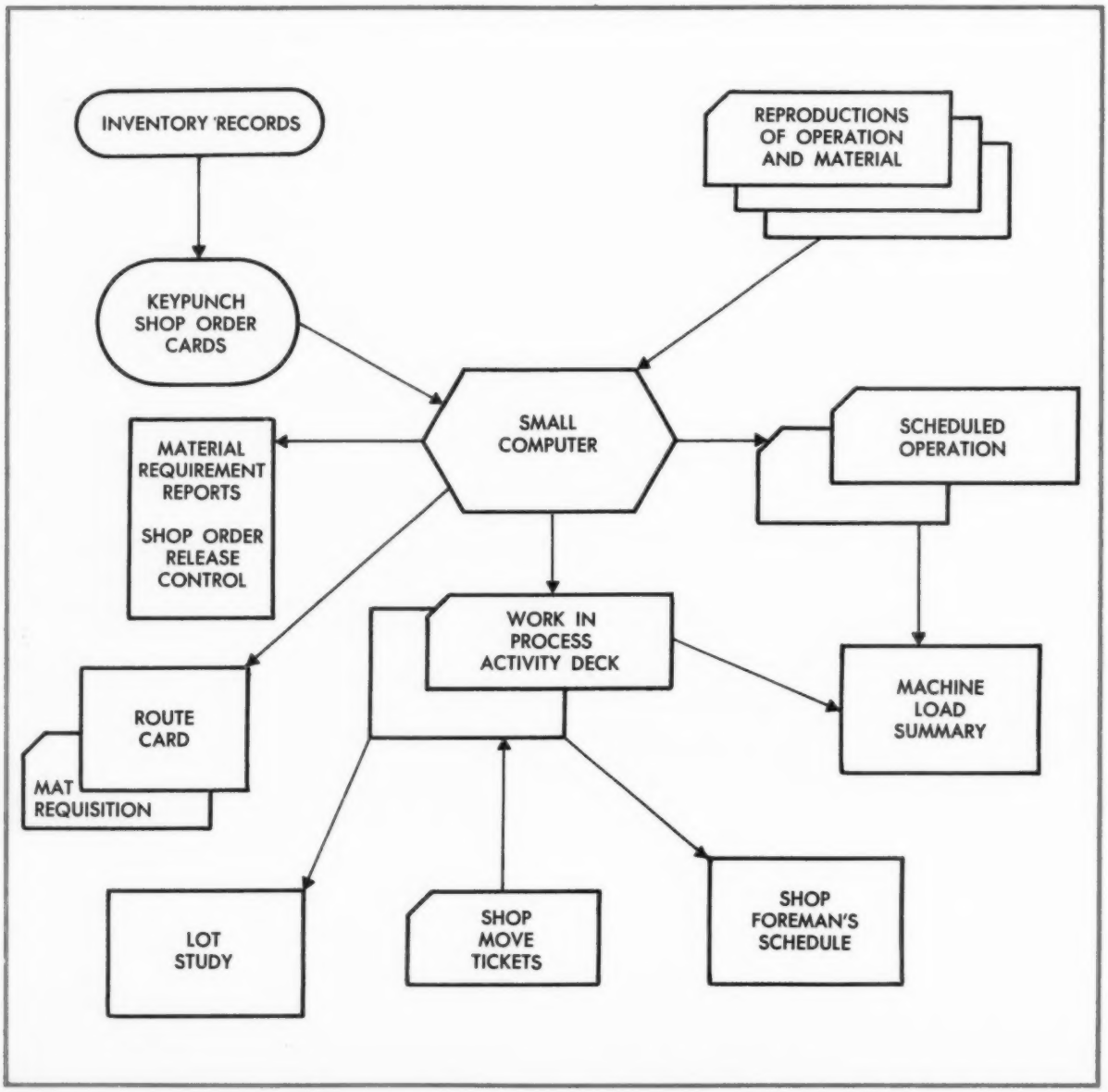
It Does Pay and Why

There is always the question of economic justification in considering the use of tabulating equipment. Justifying this equipment on the production control operation alone would have been difficult. The remaining machine time, not used in the production control operation, however, has been put to good use mainly in the cost control area where its flexibility has contributed greatly to a more

comprehensive system of standard, as opposed to actual costs. Punched card inventory records have relieved cost department personnel of a considerable amount of manual effort and aided in establishing earlier monthly and year-end closing schedules. With a 50% increase in paperwork, production tabulating still operates with approximately the same number of people as was required under the previous manual system seven years ago and a 40% reduction in cost department personnel more than off-sets the equipment rental costs.

In summation then, punched cards can be used to considerable advantage in production control operations to overcome manual processing problems associated with origination, arrangement, computation and summarization, reporting and filing of data. Utilization of machine processing speeds and the integration of related functions, through the use of this equipment, will help reduce the order cycle. Ability of the machines to handle increases in volume with a proportionately lesser effort than would have been the case under our manual system, continues to give automation a greater edge as we progress and, at last, but certainly not least, we have been able to reflect schedule adjustments in the system much earlier and far more accurately than in the past.

Given a comparable array of like production problems in your organization, I'm sure that you will benefit as has our management, through the medium of the punched card. ■



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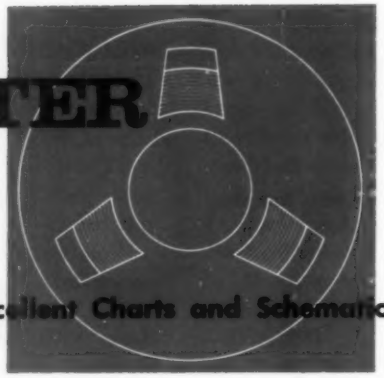


Exactly What It Says, with Excellent Charts and Schematics

By Frederick J. Rex, Jr.

An Historical Look

ACCORDING TO RECENTLY PUBLISHED STATISTICS, there are approximately 5100 punched card computers, 300 large-scale computers, 1500 medium scale computers, and 400 small-scale computers in active use. The first of these machines was delivered in December of 1948, but the last five years have seen the major technological advances in the field of electronic calculation.

It is felt that there are many executives and engineers who, though not directly connected with the highly technical phases, are indirectly connected with the fringe areas of this field. These people are likely to have a hazy concept of computer operation, and often the tendency is to throw up the hands in helplessness when confronted by rows of glowing tubes. Most people feel that they have an affinity for mechanical things because they can see the moving parts, but there seems to be a feeling of awe and mysticism when confronted by invisible electrons. This article will present a simplified, non-technical discussion for those who find themselves in the aforementioned categories.

The stored-program digital computer will be the basis for discussion as this is the type of device which, because of its flexibility and accuracy, has found the most widespread usage. The machines built by IBM, Remington Rand, Datamatic, RCA, and all the others are principally of this type. These are general-purpose machines which, as the title implies, are capable of performing a variety of operations. A machine which can work on only one or a limited number of problems is considered to be of the special-purpose type.

A Program

Now to define some of the terms already used. What is a program? And beyond that, what is a stored program? By definition a program is a series of instructions, written in computer language, which control and specify the exact function the machine is to perform. The person who has the peculiar talents which enable him to write these instructions is known as a programmer. One of the greatest problems in setting up any new installation seems to be the paucity of fully qualified programmers. Many companies have found the best approach is to train capable persons already in their organization.

An example of a stored program with which we are all familiar can be found in an automatic washing machine. Once the button is depressed, the washer goes through its entire cycle. The instructions which tell it to fill, wash, pump, rinse, and spin are stored in cams which rotate with the dial. This program is stored and can repeat itself at any time. If the instructions are easily changed, a machine falls into the general-purpose category. It is obvious that an automatic washer is a special-purpose device.

The dial telephone is another item which demonstrates a stored program. It has the ability to locate any number which the caller selects. The locating function is stored, but the number desired must be entered manually with each call. If each telephone number can be considered as an address, one might use computer language and say that the locating instructions are stored and the address portion of that instruction is not stored. The ease with which the address is changed is the basis of the telephone dial system.

The two cited examples are not to be considered as computers, but rather are to be thought of as everyday conveniences which are primarily based on a stored or partially stored program. They are used because of the ease in relating between more complicated and better-known devices.

Now that we have been exposed to programs and have heard the explanation that they are made up of a series of instructions expressed in a form which the machine can use, let us go one step further and apply them to a computer. This author likes to use the analogy between a computer and a secretary who has an impossibly poor memory. Her employer is required to write her duties on separate

slips of paper and place them in a series of pigeon-holes as shown in the diagram.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15

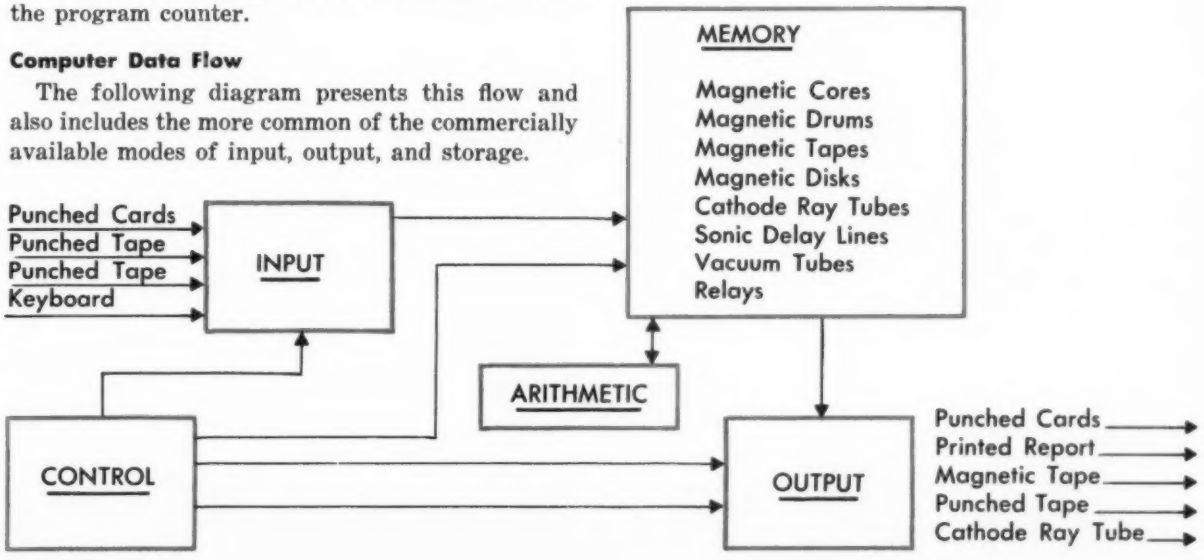
The only function this girl can perform by herself is to locate the slots in consecutive, ascending order. She goes to box one, does the specified task; then she goes to box two, does the job listed; goes to box three, and so forth up to fifteen. After this she will stop working, unless box fifteen says go back to one. Each time she examines a pigeon-hole, she does not disturb the paper therein contained. Any task listed for her in these boxes is performed with accuracy and dispatch, but she must be told exactly what to do. Also, each box may contain only one instruction or the secretary will become hopelessly confused.

These slots contain the girl's program. It is stored in permanent form and can be varied indefinitely by changing or rearranging the papers in the pigeon-holes. Care must be taken to give no orders beyond the realm of normal secretarial duties.

This is exactly how a computer works. It has a portion reserved for the program, and that section is examined, one slot at a time, in consecutive, ascending order. As each instruction is carried out, the machine returns to the next higher-numbered slot to determine its next job. In a computer, this group of pigeon-holes is known as the memory and each number assigned to a box within the memory is known as its address. The device whose function is to control which address is examined is called the program counter.

Computer Data Flow

The following diagram presents this flow and also includes the more common of the commercially available modes of input, output, and storage.



This diagram is generalized purposely, because simplicity is the keynote of this article. No attempt will be made to discuss the many types of input, output, and storage devices available. It would require a complete article to assure even a basic explanation of each category. A brief look at simplified programming would occupy many pages. Therefore, the author will state at this time only that these various modes exist and trust that the interested reader will do his own further research.

The governing factor in computer speed is the "access time" of its storage. This is the amount of time necessary to locate a specific address in memory and transfer the information contained to its proper destination. When establishing calculating speeds, it is the time necessary to transfer from memory to the arithmetic element. This speed varies widely, according to the type of storage inherent in any machine, and the costs increase rapidly as the access time is reduced. Most computers present a variety of storage which are programmed in such a way as to make maximum use of the highest-speed type. A good programmer can save valuable computer time by intelligent planning of information flow.

What is Best?

It must also be remembered that the faster machines are not necessarily the most desirable. It is not economically sound to rent a high-speed machine and then find it idle part of the time. A lower priced computer with 100% utilization, including maintenance, is the logical step towards a better installation.

The choice of the proper machine by any potential buyer is the natural concomitant of a thorough advance planning program. The wise customer is the one who doesn't jump in with both feet before

satisfactory study has been completed. Thousands spent on an adequate investigation might save tens of thousands later. Chances are that when one reaches the point of having a study made, he will find some type of computer desirable for his particular application. If it doesn't present a direct money saving, it will probably produce the fringe benefits of speed or space. These cannot be really considered as fringe benefits, as there are cases where they might be the major consideration.

Computer Categories

Computers are generally broken into four categories. First is the punched card machine which has only punched cards for both input and output. These were the first units available commercially, and if one consults the first paragraph of this article, he will find that they constitute a large portion of the market. This is rightly so, as there are many punched card installations which find this type of device ideal.

The other three categories are large-scale, medium-scale, and small-scale computers. The basis for the groupings is the selling price of each particular unit. Those selling for over $500,000 are generally considered to be large-scale, those between $50,000 and $500,000 are medium-scale, and those under $50,000 are small-scale. Due to options available, there is some overlapping.

The following is a chart of the various computer manufacturers with the total models each produces and a further breakdown by category.

These listings contain only models presently available and exclude all obsolete machines. By obsolete is meant that a machine is no longer in production. It can be readilly seen that IBM is the only manufacturer represented in all categories and also that IBM and Univac account for seventeen of twenty-nine models available.

Computers Are World-Wide

This is no longer strictly an American industry, as several foreign manufacturers have announced machines. The Bull Company of France announced a machine in 1958 at the Eastern Joint Conference. EMI Industries of Great Britain are developing a machine they call the EMIDEC, and the Japanese have announced their intention of exporting computers starting in mid-1959. This author has no knowledge of price with respect to these foreign computers.

It can be readily seen that the computer field requires a great deal of study and that there is probably a machine available for any type of application. There are companies such as Teleregister which specialize in special purpose computers for specific customers' specifications, and the American Airlines Reservation System is a prime example of the special unit.

Any person whose interest has been aroused in the data processing field will find a great deal of information about hardware and applications by consulting the many trade magazines which concern themselves with this field. ■

MANUFACTURER	TOTAL MODELS	LARGE SCALE	MEDIUM SCALE	SMALL SCALE	PUNCHED CARD
International Business Machines (IBM)	11	4	2	2	3
Sperry-Rand (Univac)	6	2	2		2
Burroughs	3		2	1	
Datamatic	1	1			
National Cash Register (NCR)	1	1			
Philco	1	1			
Radio Corporation of America (RCA)	1	1			
Bendix	1		1		
Clary	1			1	
Monroe	1			1	
Royal McBee	1			1	
Underwood	1			1	
TOTALS	29	10	7	7	5

Increasing the Utilization and Scheduling of Key Punch Sections

Even "old hands" can benefit from a closer scrutiny of this basic data processing function.

By Lois Hirst

Importance of Key Punch Operation

DATA PROCESSING SYSTEMS continue to grow larger and more complex as computers outperform each other on every hand and familiar machine procedures give way to newer more automatic methods. Common language equipment enables us to transmit information to distant locations, and many of yesterday's dreams have become today's practical realities. One of today's dreams is the automatic punching of hand written data into machine usable records. Tomorrow this too may be a reality, but today manual key punching is a vital part of most systems. There are several ways in which utilization of the key punch section can often be improved.

Organization

Since this is the only manual operation in a machine system, it is necessarily the most costly. In order to realize any cost reduction, indeed even to hold the line against a creeping increase, we must achieve the good organization which is essential to high production and accuracy. Efficiency in key punching means a savings in time and a reduction in personnel: inefficiency means a bottleneck at the key punch which can easily immobilize the rest of the installation and result in overtime, lost time and late reports. Like everything else composed of parts or relying on teamwork, the overall effort is only as productive as the weakest point in the department.

Implementation of the following ideas will, of course, vary according to the situation, but the principles are, I believe, universally sound.

Source Documents and Card Design

When a tabulating card is being designed, many factors enter the picture. Soon the various demands on the arrangement of card fields have pressed key punch considerations far into the background. The compromises made here will cost dearly in card production when the job goes on the machines! If possible, source documents should be designed around card forms; if this is impossible, then the cards must be designed around the source documents. When the source document is to be the controlling factor it will be important to weigh ease of locating information against ease of key punching for each unit of information.

A great deal of time can be saved by fully utilizing such machine features as the ability to lock in repetitive information, the limiting of carriage travel and return, automatic skipping and printing. Superfluous symbols and spacing should be eliminated as they are really the function of other machines.

It is extremely easy, when designing a card, to overlook some simple, familiar fact and to approve a card form containing minor flaws. Since such mistakes often lead to awkward operations at the punch, new card forms should be tried out on the machine before they are finalized. This step is often overlooked because of the simplicity of the machine, but it is sometimes the simple steps which cause the greatest problems.

Training

This is the area in which it is the easiest to measure the results of your efforts to improve efficiency in key punching. In many installations training consists of sitting with an "old pro" for a few days before taking over at a machine. Such hit and miss

tactics cannot be expected to produce a constantly improved standard of performance. Trainees should, if at all possible, attend the machine school of the manufacturer. If this cannot be arranged, they should be put through a formal training period on the job. This should include a thorough introduction to all machine features and practice exercises with verification of work and correction of errors.

At this point, the trainee and the experienced operator should begin to receive the same indoctrination. It is well to start by giving the new operator an overall picture explaining the job briefly from beginning to end. Although this may sometimes fall on deaf ears, it will in many instances produce a more intelligent and interested attitude. Anyone worth hiring is worth this small investment of time! You may well be beginning the development of one of your future key people. The operator should be given the machine set up and punch procedure she is expected to use. She should not be left to work these out for herself.

Here, I prefer to use jumbo card forms with card fields and control keys clearly indicated. These can be kept in front of the operator while she is working for the short time which will be required for her to learn the card form. At the same time, they eliminate the need to use written procedures, which many operators are not inclined to follow too closely. Of course, the operator should correct her own errors. Initially, accuracy will be far more important than speed.

Scheduling

In large departments where numerous applications are being processed, the problem of scheduling can become paramount. For maximum machine utilization, work must be ready and waiting to be punched; whether or not this will be the case may be dependent on the nature of the business, but there must, of course, be a production schedule. The amount of punching to be done and the number of people required to do it should be carefully analyzed. With a properly staffed section, a good work schedule and alert supervision, overtime can be reduced. Unfortunately, overtime is often used for routine work rather than being reserved solely for peak loads and problem areas.

There are several acceptable approaches which can be used when numerous card forms and punch procedures are involved. The operator must be familiar with the set up for the application on which she is to work. Record the amount of time spent, volume produced and percentage of errors, and compare results from different operators.

While the need for flexibility will undoubtedly indicate training all operators on all applications, practical usage may also indicate advantages to assigning selected operators to certain jobs, at least for the bulk of the work. If the punch procedures vary a great deal, it will be difficult to achieve maximum speed and accuracy from operators who work on many applications. Cross-training should be practiced to the fullest practical extent and only experience with an individual situation will indicate at what point it has become impractical.

The Human Element

We are machine-minded people; we have to be to survive in this field. Bear in mind when considering the problems of the key punch section, that this is one place where the machine is incidental to the operator. Too often in the normal rush of machine room activity, little time and thought is given to the operators as people. They must be recognized as individuals and handled accordingly with stress given to each person's contribution to the overall effort. Since the greatest production comes from people, alert management constantly seeks ways to gain and hold interest. Many companies today are finding sound incentive plans an asset in this area.

There is, of course, nothing more important than the careful selection of personnel in the beginning. It is my belief that there are very few young girls who cannot be trained to be competent key punch operators. If a girl is a high school graduate with a reasonable amount of manual dexterity, she can be taught to key punch. Not all such girls, however, can be developed into interested, cheerful workers. Initiative, energy and a sense of responsibility are the illusive qualities we seek.

Unfortunately, now and then we find ourselves with a good experienced operator who is a professional troublemaker. Every installation has or has had its share. These people lower the morale of the entire group. Even when their own production does not suffer, and most often it does, they invariably interfere with the work of less experienced operators. Like weeds, they should be uprooted quickly when they are discovered.

Look Ahead

There has been a veritable explosion of data processing systems in American business. Input for those systems commercially available today is largely punched cards and punched paper tape. How long this will be true, no one can say. New methods being tested today will probably complement rather than replace methods now in use and even then, key inquiry boards and "on-line" entry devices will present similar situations to those found in key punch sections now. The expansion of data processing demands new concepts of key punching methods which will result in greater efficiency than we have yet achieved. ■

PRODUCTS & SERVICES

NEW CARD DEVELOPER

A new Card Developer for development of microfilm copies in unitized form has been announced. The Developer, combined with the Card-to-Card Printer and Actifilm Printer, is used for preparing working microfilm copies of engineering drawings, medical case histories, research and library materials, intelligence records, insurance records, architectural tracings and title and abstract documents.

Unitized microfilm, in the form of Actifilm sheets or aperture cards, passes through the machine, on a horizontal plane, to the rear receiving tray, eliminating curling or bending of the cards. It is not necessary to determine a "*face up*" position of the material to be developed, since both sides are equally exposed to the developer vapors.

The high speed capacity of the Developer will handle the production of the companion exposure units, the Card-to-Card Printer and Actifilm Printer. The three units, used together, form a system for reproducing existing microfilm through a dry process. The Actifilm Printer prints from roll microfilm to diazo sheets or to Ozacards. The Card-to-Card Printer furnishes duplicates in quantity, from master Actifilm cards or master Filmsort cards and the Card Developer develops the production of both printing units. Microline Products Group, Ozalid Division, General Aniline and Film Corp., 30 Corliss Lane, Johnson City, N. Y.

BUSINESS MACHINE ELAPSED TIME METER

An instrument specifically designed to register actual machine time of all types of electric or electronic punched card and data processing machines including the key driven types, has been announced. The Engler Business Machine Elapsed Time Meter accurately register hours and hundredths of hours of actual machine processing time. It provides better scheduling of machine use and elimination of machine inactivity. Engler Instrument Co., Jersey City 5, N. J.

"NUVISTORS"

High-efficiency thimble-size electron tubes are made possible by new RCA Nuvistor Design. The new tubes will lead to electronic developments in such instruments as television sets, communications receivers and computers, as well as more compact and efficient electronic equipment for defense and industry.

Prototypes of the new tubes are now in advanced development stages at the Division's laboratories in Harrison, N. J. They were demonstrated for representatives of the electronics industry, the military and the press.

Mr. D. Y. Smith, Vice President and General Manager, RCA Electron Tube Division, said, "*Electron tubes have by no means reached the limit of their low-cost, high-performance capabilities. Through the study of new materials, new processes and new techniques, our engineers have not only developed the Nuvistor but foresee the practicality of even smaller tubes having power consump-*

(continued on next page)

tion reduced to one-twentieth the power required for conventional tubes."

The name of the new tube design is based on the words *"nueva"* meaning new and *"vista"* meaning prospect. Hence, the *"new look"* or *"Nuvistor."*

INCREASED STORAGE

Double capacity disk storage files for the IBM 650 and 7070 Data Processing Systems have been introduced by the IBM Data Processing Division. The new disk files each provide a random access memory of 12,000,000 digits of information.

Up to four of the double capacity files may be used with either the IBM 650 or the IBM 7070 to give a total disk storage of as many as 48,000,000 digits, any of which can be located in less than a second.

The new double capacity files—the Model 2 IBM 355 Disk Storage Unit for the 650 and the Model 2 IBM 7300 Disk Storage Unit for the 7070—contain the same 50 disks as the 6,000,000 digit capacity Model 1 units. The increased capacity has been achieved within each disk area by doubling the number of tracks used for recording data.

Since the Model 1 and Model 2 disk files can be installed either singly or in any combinations of up to four units they provide storage capacities of 6, 12, 18, 24, 30, 36, 42, or 48,000,000 digits. The new double capacity disk files also permit reduced access time to stored information because of the greater density of data storage. For example, data which required 50 disks of storage on the 6,000,000 digit file can be stored on 25 disks of the new file, so that the movement of the access arms used to seek data will be less and the seek time will be proportionately reduced.

READ-OUT FORM PRINTER

A read-out form printer with a 12 decade capacity and an automatic form ejector has been developed by the Electronics Division of Clary Corporation.

Designated the Clary Model 1941, the unit is an extension of the Clary Parallel Entry Data Printer with a paper transport mechanism which precisely positions pre-printed forms.

Typical applications for the Model 1941 are recording automatic check-out data, logging instrumentation data, recording quality control reports, automatically recording inspection records and printing gummed labels and inspection tags.

An original and three carbons can be printed on special "carbonless" paper in either 3½x7 inch or 3½x3½ inch sizes at the rate of 2½ lines per second.

Equipped with an electrically controlled dater independent of data columns, the solenoid-operated form printer weighs 40 pounds and measures 20x11x9 inches. Clary Corp., 408 Junipero St., San Gabriel, Calif.

ERROR-CORRECTION

Lightning flashes and other electrical disturbances which cause static and noise on communication lines may result in groups or bursts of errors in the data being transmitted over these lines.

The terminal equipment required for a new code is simple and inexpensive, and synchronization is relatively easy to maintain. The new code is applicable to systems where the data must be accepted and delivered continuously, rather than in batches, according to the inventor.

Terminal equipment using the new code can be designed to handle practically any length error burst which system analysis indicates is required. In general, the shorter the maximum burst length to be corrected, the smaller and simpler will be the terminal equipment. Also, a short burst length will result in less guard space, or *"clean data section,"* which must follow the burst before another group of errors can be corrected.

In its simplest form, the coding system uses alternate data digits and check digits, giving a redundancy of one-half. If such a system is designed to correct error bursts of length six or less *(three data digits and three check digits)*, the encoder consists basically of a shift register of length seven. The data digits enter the first position, and are shifted through the register before being transmitted. At each shift, a check digit is computed which makes parity *(the sum of 1's)* of the check digit and the data digits in the first and fourth positions even *(zero or two)*. This check digit is transmitted soon after it is computed, preceding the transmission of its nearest associated message digit by seven digits. Data and check digits emerge from the coding system alternately, forming the coded message.

Evaluation of the new code is now being conducted under transmission line conditions by Dr. F. E. Froehlich of Bell Laboratories. Initial results indicate substantial improvement factors in code redundancies of ½ and ¼. The evaluation program is continuing.

■ ■ ■

USEFUL LITERATURE

For your convenience in obtaining pertinent and helpful information on the latest equipment, forms, services and related products in the data processing field, we direct your attention to the following free literature available from the manufacturers. Circle the numbers pertaining to the literature you wish to receive on the Reader Service Card appearing elsewhere in " P C D P." Mail the card to us and we will speedily forward your requests.

VERTICAL AND ROLL FILING SYSTEMS 1959 CATALOG, just issued, includes new and improved items of special interest to engineers, designers and architects. The two-color catalog, with large illustrations of all products, is available from engineering supply and office equipment dealers or from Plan Hold Corporation, 5204 Chakemco, St., South Gate, Calif.

Circle No. 21 on Reader Service Card.

SELF-STICKING KEY-PUNCH CORRECTION SEALS testing sample plus Bulletin No. 188 available without charge. H. W. Brady Company, 727 West Glendale Ave., Milwaukee, Wis.

Circle No. 22 on Reader Service Card.

AUXILIARY EQUIPMENT Catalog 10, comprises 80 pages of auxiliary equipment for data processing departments. The catalog, illustrated with 227 photographs, is organized for easy reference into separate sections for card filing, card handling, control panel storage, and tape handling equipment. Catalog 10 may be obtained from local Tab representatives or from Tab Products Co. at 995 Market St., San Francisco 3, Calif.

Circle No. 23 on Reader Service Card.

SYNCHRO-TAPE TYPEWRITER is illustrated in four-page brochure which explains the techniques by which the Synchro-Tape Unit eliminates the manual jobs of card punching and verifying. Monroe Calculating Machine Co., Orange, N. J.

Circle No. 24 on Reader Service Card.

HOW TO DECENTRALIZE WITH CENTRALIZED CONTROL is the title of a new publication

(continued on next page)

which has been announced by Remington Rand. Including an article on decentralization by Louis A. Allen, which is reprinted from a leading trade publication, this brochure should be of particular interest to all management personnel. A copy of this brochure can be obtained at any Remington Rand branch office or by writing to the company at 315 Fourth Ave., New York 10, N. Y. and requesting RT 8952.

Circle No. 25 on Reader Service Card.

DYKOR AUXILIARY TAPE PROCESSING EQUIPMENT is a six-page brochure which describes the function and application of the equipment. There is also a description of the building block modular units which go into the makeup. Price ranges are included. Ask for Bulletin TPG 39 specifying the type of computer you are presently using. Digitronics Corp., Albertson, L. I., N. Y.

Circle No. 26 on Reader Service Card.

MECHANIZATION AND CONTROL OF AGENCY OPERATIONS is a new brochure describing how Remington Rand Univac data processing methods can streamline operations and facilitate expansion for advertising agencies. A copy of this brochure U1524 can be obtained at any Remington Rand branch office or by writing to the company at 315 Fourth Ave., New York 10, N. Y.

Circle No. 27 on Reader Service Card.

SPECIAL INVENTORY BOOK, available to users of business forms, shows monthly usage and balance on hand. Each inventory leaf is backed up with a specification page which is designed to get all of the essential facts for reordering. Here may be kept a record of sizes, number of copies, papers, leaf to leaf copy changes, inks, numbering, perforations, carbons, and binding or packaging. A copy of the Forms Inventory Book, now in its fourth printing, is available without charge from the Baltimore Business Forms Company, 3128 Frederick Ave., Baltimore 29, Md.

Circle No. 28 on Reader Service Card.

PEOPLE AND PLACES

IBM ANNOUNCES MAJOR RE-ORGANIZATION

Development and Manufacture

T. V. LEARSON will be vice president and group executive for the following divisions:

The *Data Systems Division,* which will develop and manufacture large scale electronic data processing systems. WILLIAM B. McWHIRTER, formerly general manager of the Supplies Division, is now general manager of this division, which will operate the plant and laboratory at Poughkeepsie, N. Y.

The *General Products Division,* which will develop and manufacture intermediate and small computing systems, and punched card accounting machines. ORLAND M. SCOTT, previously president of The Service Bureau Corporation, has been named general manager. The division will operate plants at Endicott, N. Y., Burlington, Vt., Rochester, Minn., and San Jose, Calif.

The *Advanced Systems Development Division,* announced in April, which will design and engineer commercial machine systems in order to mechanize hitherto undeveloped information handling areas. The division will also explore new applications made possible by the most advanced technologies. The general manager is J. A. HADDAD.

Sales

McLAIN B. SMITH, previously vice president and general manager of the Data Processing Division, was named vice president and group executive for the following divisions:

The newly-created *Data Processing Division,* which will lease or sell, and service, the complete line of IBM punched card accounting machines and electronic data processing systems for all domestic markets except the federal government. GILBERT E. JONES has been named general manager of this division.

The new *Federal Systems Division,* which was created to serve all federal agencies and the military in all data processing areas. The division combines the engineering, manufacturing, systems management and marketing functions of the Military Products Division with the field support of the company's Washington Federal Office. This places all of IBM's government activities in one division. CHARLES BENTON, JR., has been named general manager. The division will continue to operate plants and laboratories at Kingston and Owego, N. Y.

The *Supplies Division,* which was formed in 1956, and which designs and produces punched cards, magnetic tapes and other supplies used in IBM data processing systems. JAMES E. SWAINE, JR. has been named general manager.

The *Service Bureau Corporation,* a wholly-owned independently-operated subsidiary of IBM, formed in 1957, which consists of a nationwide network of 80 offices offering data processing services to customers on a contract basis. FRANK T. CARY has been elected president of this corporation.

The *IBM Electric Typewriter Division* will continue to be directed by Vice President H. W. MILLER, JR., and the company's wholly-owned subsidiary, the World Trade Corporation, will remain under the management of A. K. WATSON, President.

ELECTRODATA DIVISION CHANGES

ROBERT S. BARTON has been named manager of applied programming and KERMITH H. SPEIERMAN has been appointed assistant to manager of technical services for Burroughs Corporation's Electro-Data Division.

Barton came to Burroughs from the Shell Development Company, where he was head of the computer research group. A mathematics graduate of the University of Iowa, he has spent approximately eight years

in data processing and program research work.

Speierman had most recently been in charge of the computer installation of the Atomic Energy Division, Babcock & Wilcox Company, at Lynchburg, Va.

DR. E. L. EICHHORN has been appointed manager of applied mathematics for ElectroData. The announcement was made by Marketing Director E. S. McCollister.

Eichhorn has been engaged in the field of data processing for approximately ten years. Born and educated in The Netherlands, Eichhorn holds degrees from the universities of Delft and Amsterdam.

REDSTONE ARSENAL

The Army Ballistic Missile Agency has finished installing another Burroughs 205 medium digital computer — this one in their Computation Laboratory.

Primary function of the 205 will be the rapid processing of data received in the data reduction branch of the laboratory to expedite information on ground and flight tests of missiles.

BATTELLE MEMORIAL INSTITUTE

JOHN K. WETHERBEE has been named Chief of the System Engineering Division at Battelle Memorial Institute, Columbus, Ohio. In this post he assumes responsibility for directing the Division's varied program of research on automatic processing and control systems. Much of the Division's work has been in the design and development of digital and analog components and circuitry and in the development of special purpose computer systems.

The Battelle technologist helped organize the Systems Engineering Division in 1956 and has been closely associated with studies in analog simulation, human engineering, servo-mechanism analyses, and systems analyses.

BANK RECORD SPECIALIST JOINS DIEBOLD

Cooperating with banking and business to control the huge inundation of recordkeeping, Diebold, Inc. has appointed RODNEY T. SAMPSON as product manager for the company's systems printing operations.

Formerly systems manager for Loan-a-matic Systems of Hartford, Mr. Sampson has been working in the design of specialized record and coding methods for banks, particularly in the installment loan and mortgage divisions.

DR. ENGSTROM HONORED

DR. HOWARD T. ENGSTROM, vice president and director of Univac Scientific Marketing, Remington Rand Division, Sperry Rand Corp., was given formal recognition of his election to the grade of Fellow in the Institute of Radio Engineers on March 25. The occasion was the annual banquet held at the Waldorf-Astoria Hotel in New York during the Institute's 1959 national convention.

Dr. Engstrom is one of the creators of the Univac Scientific electronic computer, which has been in use in government and industrial engineering and scientific applications for the past decade.

■ ■ ■

Announcement . . .

Punched Card

DATA PROCESSING

To be issued **MONTHLY** —
Starting with the
January 1960 issue

IT IS with a greal deal of satisfaction and pleasure that we announce the new monthly frequency.

During its first year and including the Charter issue we will have brought you seven bi-monthly issues. Each of these issues will have had a special theme:

1. **Punched Cards**
2. **Punched Tape**
3. **Computer Feasibility**
4. **Service Organizations**
5. **Forms and Auxiliary Equipment**
6. **Operations Research**
7. **(To be announced)**

Combined, these issues constitute a basic reference library on data processing. For some, this will have been an introduction to many new principles and approaches. For others it will have been a review—and who is there among us who cannot benefit from an occasional return to basic principles.

For all, these issues will have presented new developments and ideas in the departments and articles of general interest.

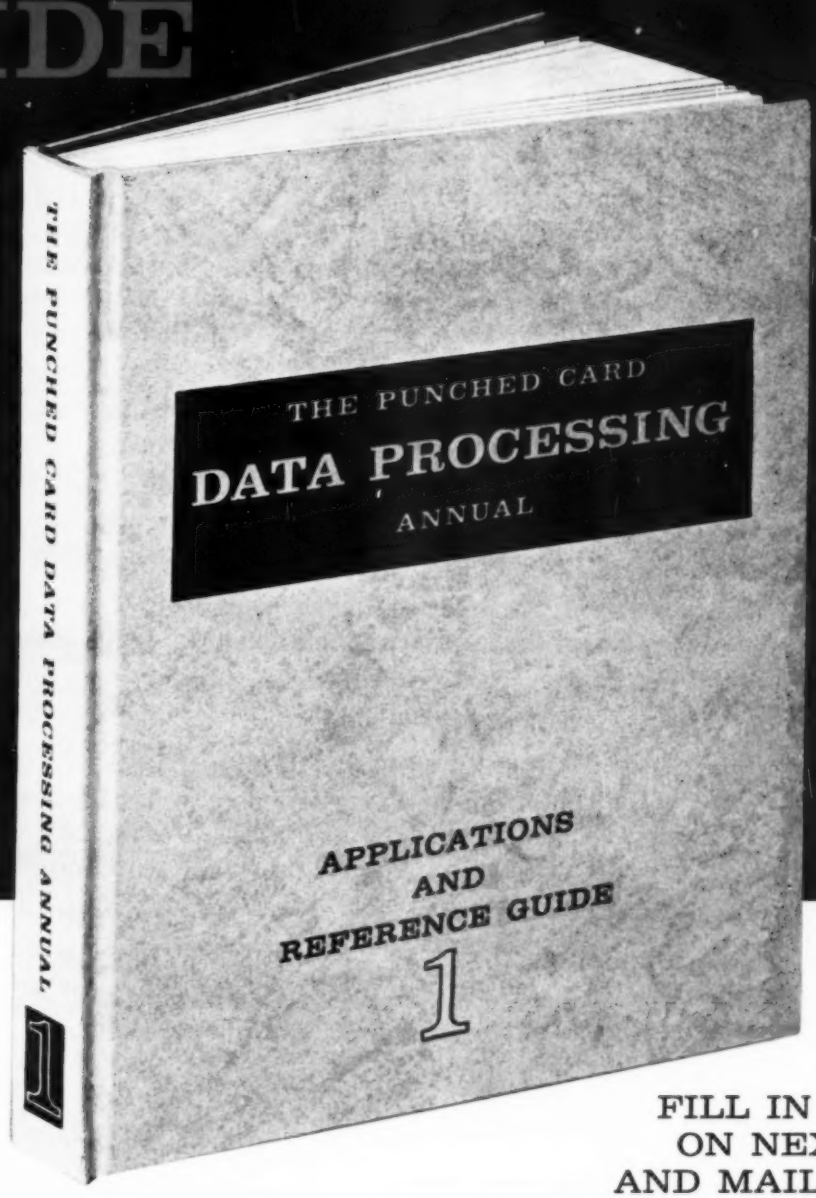
And now, as we plan the material that will reach you in twice as many issues next year, we will be mindful of those areas of interest which have aroused the greatest comment.

There will be an increase of information on more basic subjects—*punched card methods and procedures, systems and related "bread and butter" subjects.*

Of course, we are able to double the number of issues, *without* increasing subscription rates, because of the enthusiastic response you have accorded this magazine in its first year. And it is this enthusiasm which permits us to further expand our editorial facilities so that we may bring you all that is important in data processing.

The Editors.

NEW... PUNCHED CARD-DATA PROCESSING REFERENCE GUIDE



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- Production Control
- Cost Accounting
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Each category includes one or more applications for *each of the major business, industry or governmental* classifications and utilizes all types of equipment. More than 40 applications never before presented.

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SPECIAL REPORT *(continued from page 9)*

once there is agreement of fact, would appear to be a new clarity in our conversation and in all other forms of communication.

What could be more clear than the following: When referring to *punched card equipment* why not say "punched card equipment" rather than tabulating equipment, machine accounting equipment, or others? And refer to punched tape equipment and computers specifically rather than by the more sophisticated terms. Then reserve the more general terms *punched card* data processing, *electronic* data processing, *automated* data processing and *integrated* data processing for more appropriate usage.

This can be accomplished, as indicated earlier, only by unified action on the part of those major influences in this field, the manufacturers, associations, publishers and educational institutions. Now is the time to take action before the situation becomes further confused and more difficult to remedy.

The *facts* presented are impartial. They were processed by an independent firm and are offered for your consideration.

The *comments* are our sincere views made with some knowledge of the problem and the need for correction. Our only interest is in serving you to the best of our ability for therein lies the hope for continued success. We submit that if there are better solutions we are most anxious to know of them and we will do all in our power to aid in their accomplishment.

The *results* will come from your action—in your company, in your trade associations, in your contacts with each other and with manufacturers and suppliers. We hopefully solicit your comment. ■

HOW TRUE—HOW TRUE!

With generous apologies to everybody—everywhere

An Engineer

Is a man who knows
A great deal about very little
And who goes along
Learning more and more
About less and less
Until, finally, he knows
Practically everything about nothing.

A Salesman

On the other hand, is a man
Who knows very little
About many things
And learns less and less
About more and more
Until he knows
Practically nothing about everything.

A Purchasing Agent

Starts out knowing
Everything about everything
But ends up knowing
Nothing about anything
Due to his association
With engineers and salesmen.

Education for DATA PROCESSING

AMA Seminars, Conferences, Courses and Services

The schedule for July through November 1959 lists 12 different gatherings concerning punched cards, machine accounting and electronic data processing. For further information write to AMA Headquarters, Hotel Astor, Times Square, New York, N. Y.

The Management Science Training Institute of John Diebold and Associates, Inc.

Several seminars in automatic data processing have been scheduled, to be held in May and June in Chicago and New York. Additional information may be had by contacting Management Science Training Institute, 40 Wall St., New York 5, N. Y.

Courses in Frontier Research on Digital Computers

Introduction to the use of digital computers, August 17-28, 1959. University of North Carolina, Extension Division, Chapel Hill, N. C.

Marquette University's Management Center

A series of one day and one week courses in the field will be held during May and June. For details, write to Management Center, Marquette University, Milwaukee 4, Wis.

The University of Michigan's Summer Session of Courses in Computer Science and Engineering

Direct request for information to Summer Session, College of Engineering, The University of Michigan, Ann Arbor, Mich.

PCDP BOOK SHELF

HIGH SPEED DATA PROCESSING by C. C. Gotlieb and J. N. P. Hume, Series in Information Processing and Computers, McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y., 1958, 338 pages, $9.50

This book in the above series is quite valuable to the busy business executive in that it covers the technical areas comprehensively yet basically. The latter part is devoted to typical applications which are suited to data processing such as payroll, utility accounting, production and inventory control and simulation operations. The first part of the book, if sequence may be reversed, covers the technical considerations in data processing. These are functional units, machine organization, programming and a comparison of machine techniques. These are but a few of the titles and subtitles defining areas of explanation in the book. Its recent publication date enhances its validity as a management guide to data processing.

FASTER, FASTER by W. J. Eckert and Rebecca Jones, Watson Scientific Computing Laboratory, McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y., 1956, 160 pages, $3.75

To quote the sub-title on the title page, this book is "A Simple Description of a Giant Electronic Calculator and the Problems It Solves." The authors use the special purpose computer, NORC, built by IBM for the U. S. Naval Ordnance Department. The book remains very elementary yet covers design and highly technical areas of computer operation. Although the authors refer to the NORC for specific examples, the principles and basic diagrams used to illustrate these principles are applicable to electronic computers of other manufacturers. It is a very readable and qualified basic book on the tools of data processing.

THE OFFICE IN TRANSITION — MEETING THE PROBLEMS OF AUTOMATION by Esther R. Becker and Eugene F. Murphy. Harper & Bros, 49 E. 33rd St., New York 16, N. Y., 190 pages, 1956, $4.00

By utilizing a dual approach to the impact of automation in the office, the authors present a total look at this highly volatile and ever changing situation. Mr. Murphy covers the technical aspects of the automatic office and Miss Becker presents the effects of automation on the people involved. This double aspect highlights the fundamental conflict — man vs. machine. That this conflict can be resolved and very often has been and is, is the essential worth of this volume. It involves a continuing process of education by suppliers and users. Of special note are the appendices which list the manufacturers, associations, publications and educational institutions which are operative in this field.

WORK SIMPLIFICATION by Gerald Nadler, Ph.D., McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 36, N. Y., 292 pages, 1957, $6.50.

Dr Nadler has written a "do-it-yourself" of manual work methods. Much of the material is from the author's *Motion and Time Study* book plus additional material from a television course he presented. The book deals almost exclusively with *what* and *why* and is very rarely concerned with *how* theory. In applying these methods, the role of the individual as a person and his reaction to these concepts as they are applied in his particular situation are covered. Also featured are a finer analysis of new Therbligs as well as UNOPAR which is an electronic device for measuring an operator's motions.

CALENDAR of Coming Events

1959

June 13-21 UNESCO
"First International Conference on Information Processing" (ICIP)
Paris, France
Contact: U. S. Committee for the First International Conference on Information Processing
Box 4999
Washington 8, D. C.

June 14-18 American Association of Mechanical Engineers
1959 Semi-Annual Meeting
St. Louis, Mo.

June 21-24 National Association of Accountants
"40th International Accounting Conference"
Waldorf-Astoria Hotel, New York, N. Y.

June 24-26 National Machine Accountants Association
"8th Annual National Conference and Business Show"
Chase and Park Plaza Hotels, St. Louis, Mo.

Sept. (date to be announced) Institute of Management Sciences, ISM
Sixth Annual International Meeting
Conservatoire National des Arts et Metiers
Paris, France

Oct. 24-28 Controllers Institute of America
"28th Annual National Conference"
Hotel Penn-Sheraton, Pittsburgh, Pa.

INDEX TO ADVERTISERS

EDITORIAL

CHARTING

The Procedure Flow Chart—an Analytical Tool

By Eugene F. Murphy

WHY CHART? Why draw lines and symbols when a few notes would do just as well? There are several reasons for drawing a chart. One which comes most readily to mind is that a chart is a pictorial representation. Pictures are supposed to make things clearer. Each symbol and form of a chart should be designed to represent as clearly as possible the situation it is intended to depict.

A chart is a means of gathering facts. We may possibly get along without pictures, but we cannot get along without facts. It is quite possible that facts can be gathered and written in prose form more easily and quickly than they can be charted, however, fact gathering is no automatic process. Considerable discrimination is required in deciding what facts should be collected and a chart is one of the best devices to prevent digression. It serves as a road map to tell the analyst what information he should seek and that which he should ignore. The chart should be designed so that it prompts the analyst to gather all the facts that he needs and at the same time to gather no more than he needs.

A chart reveals patterns. Not only must a chart adequately represent the facts in pictorial form, but the picture must present the facts so that the important ones stand out and unimportant ones are subordinated. It is recognition of these patterns by the analyst that indicates good operations or trouble spots. The chart should be designed so that it makes easy to see the important patterns of good or bad situations and minimizes facts which are not essential.

The Procedure Flow Chart is a tool for outlining the patterns of work. It is designed to give a panoramic view of office operations. It is not used to reveal minute detail, but rather the overall picture. It shows us which people or organizational elements are involved, the procedural steps, the forms used, the path they follow and their disposition. It tells us *what* is done by *who*, but does not detail *how*, *when*, *what with* or *how often*. These latter questions are taken care of later in more detailed Task Charts.

The Procedure Flow Chart, because it gives perspective, is an analytical tool for the person who is studying office operations to effect improvements. It is an excellent device for informing others of the situation. Members of top management who do not have time to study detailed charts quickly grasp the story told by the Procedure Flow Chart. On the other end of the organization scale, employees who are not at all trained in methods techniques find it easy to follow procedures when they are outlined in the Procedure Flow Chart.

The Procedure Flow Chart is a diagram, almost in picture form, of the tasks performed in carrying out a single office procedure. The basic framework for the chart is a paper divided into vertical columns. Each form which enters into the procedure is indicated by a symbol intended to call to mind the form. Lines trace the flow of the form from one person or element to another. The emphasis is upon visual, graphic methods of conveying the story, rather than upon words or numbers.

In charting it is essential that we follow some simple conventions or standards in order that all charts will be consistent and readily understood by others. Standards are not rules, however, and if a situation cannot be properly pictured in conventional fashion, it is quite permissible to make reasonable alterations of the standard.

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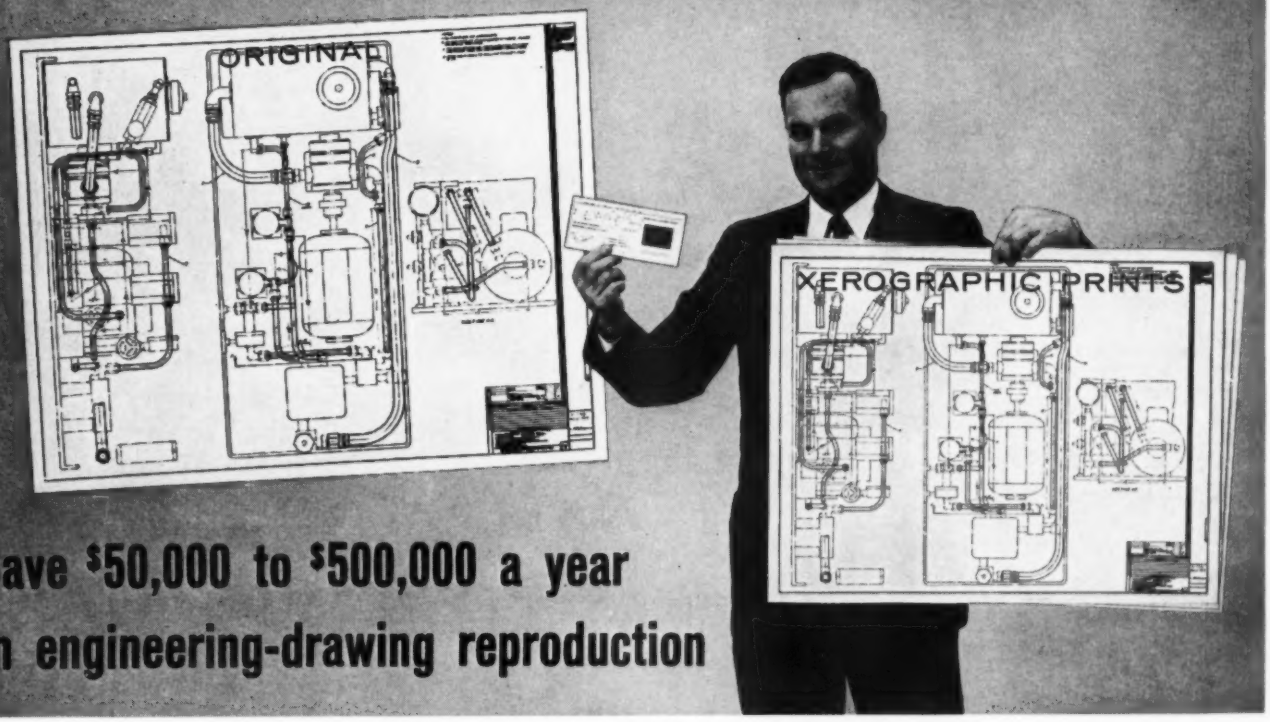

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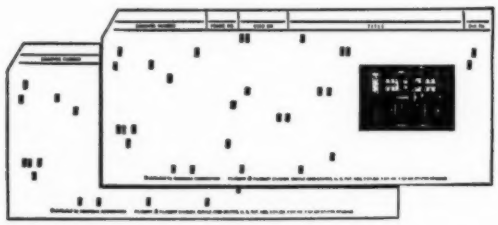

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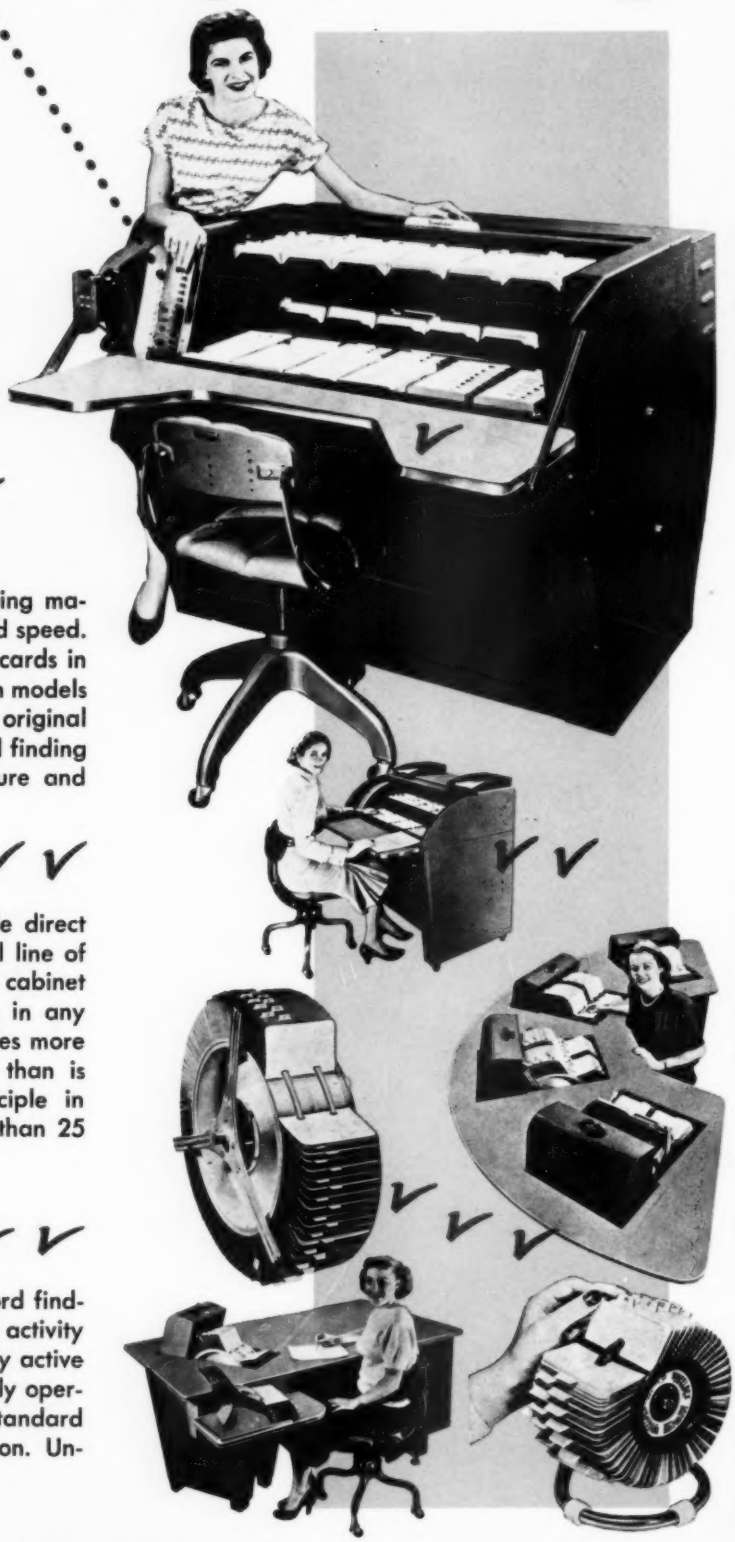

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